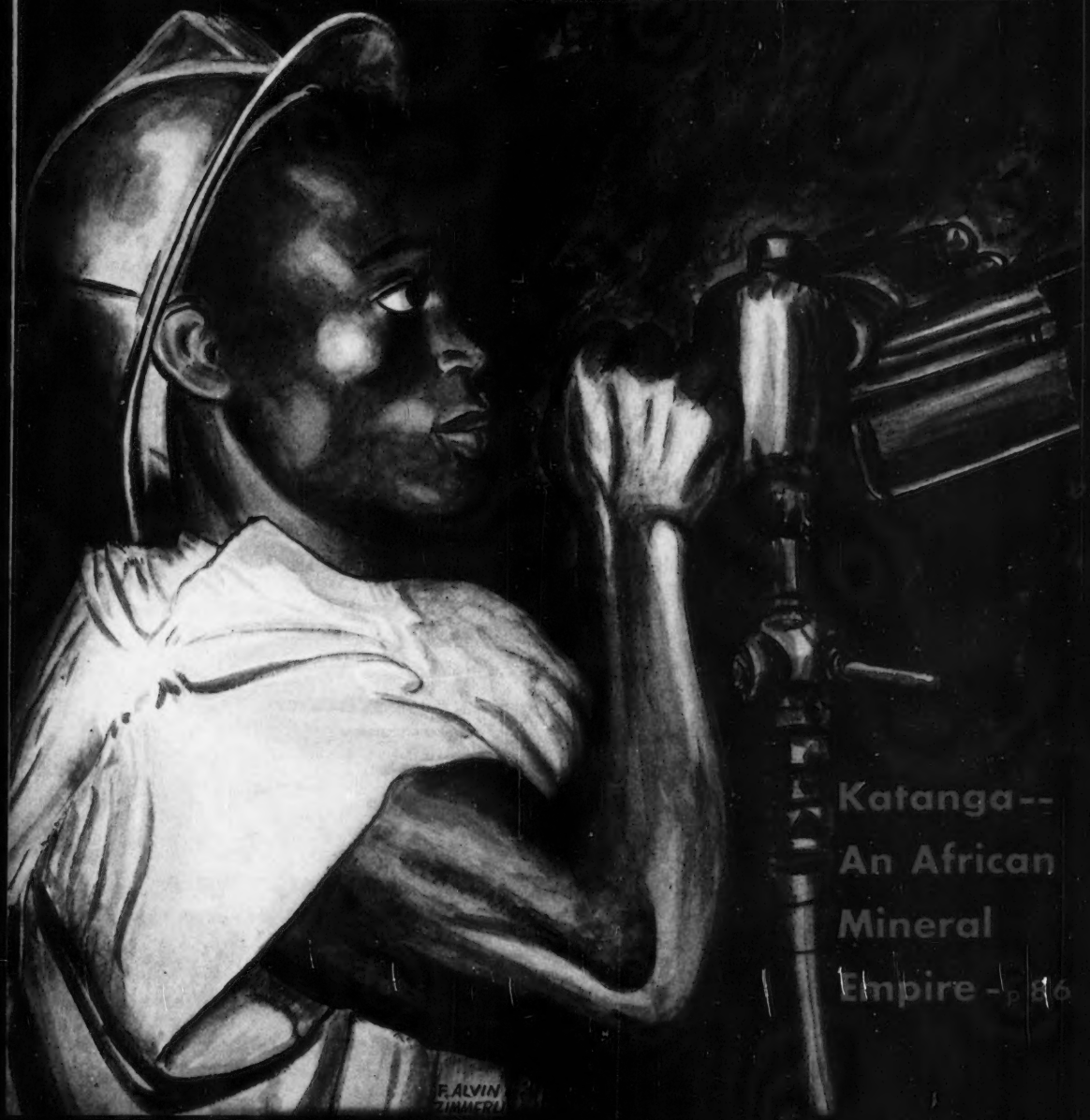
SPECIAL:
SHERRITT-GORDON NICKEL—
NEW VENTURE, NEW PROCESS—p 72

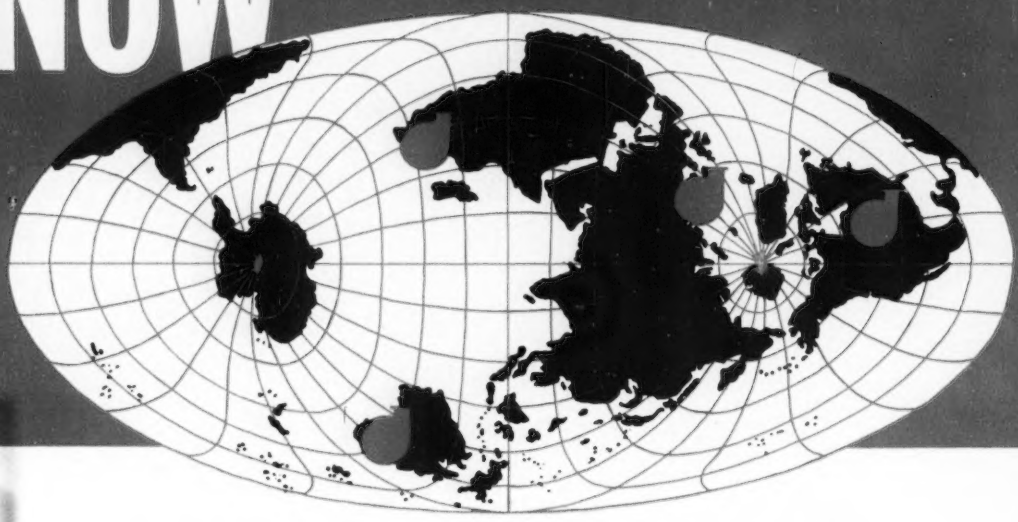
ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION
NOVEMBER 1951
PRICE FIFTY CENTS
FOUNDED 1866



Katanga—
An African
Mineral
Empire—p 86

NOW



in the four corners of the mining world

Now that Hydroseals are being manufactured in Sweden by Morgardshammars Mek. Verkstads Aktiebolag of Morgardshammar, there's hardly a major mining area on the globe that can't easily get the best in abrasives-handling pumps. Our newest manufacturing agent, Morgardshammar has been producing quality equipment for mining and industry in northern Europe for more than half a century.

Like Denver Machinery Co., Ltd., of Johannesburg, South Africa, and like Hobart Duff, Pty., Ltd., of Melbourne, Australia, Morgardshammar will not only manufacture Hydroseal Pumps, but will also provide complete sales and engineering service.

We are proud to join hands with Morgardshammar.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. B—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

Here's how this DB-35 Drifter Combination can boost your output

When you combine a 3½" drifter that packs the drilling power of many 4" machines—with an air-powered jumbo that cuts drilling time 33% per round—with a long-feed aluminum shell that permits fewer steel changes—with Carset Jackbits that drill 50% faster—**THEN** you have an Ingersoll-Rand drilling combination that's sure to boost your output.

The DB-35 Drifter has a new double-kicker port valve that has resulted in stronger rotation, better hole cleaning, and higher overall efficiency with a big saving in air consumption.

The DJB-2 Boom Jumbo has air-operated booms that raise and lower the drill at the touch of a finger, saving time and effort in making set-ups and spotting the drill from hole to hole.

The Long-Feed Aluminum Shell has the extra length that permits the use of longer steels, with fewer steel changes for a given footage. Aluminum construction cuts shell weight in half.

Carset Jackbits not only increase drilling speeds 50% or more—they out perform a steel bit usage by as much as 400 to 1, practically eliminate bit changes, permit use of longer steels, and cut dynamite requirements by as much as 30%.

Let our experienced rock drill salesmen tell you more about this I-R Drilling Combination. There's a branch office near you.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 667-5

ROCK DRILLS • COMPRESSORS • AIR TOOLS • CENTRIFUGAL PUMPS • TURBO BLOWERS • CONDENSERS • DIESELS • GAS ENGINES

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

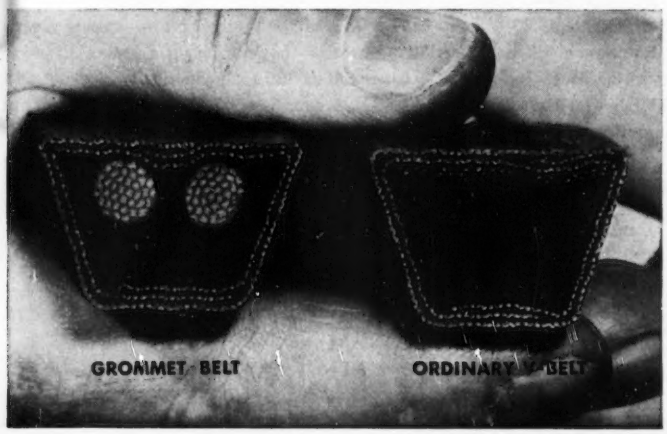
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. EM-11
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

ENGINEERING AND MINING JOURNAL

VOLUME 152 — 85th YEAR OF PUBLICATION — NUMBER 11

NOVEMBER, 1951

E&MJ Outlook ... 67
Market Summary ... 68
E&MJ Highlights ... 70
Editorial ... 71
Sherritt Gordon Develops Lynn Lake Nickel-Copper ... HOWARD L. WALDRON 72
We'll Have To Plan Now To Meet Future Zinc Needs ... WILLIAM P. SHEA 79
Those Famous Old Hand-Drilling Contests ... ATHA ALBERT RICHIE 84
Katanga's Mineral Empire Based on Many Metals ... EDGAR B. SENGIER 86
Keeping Tab on Practice ... 90
Finding a Way To Handle the HMS Middling Problem ... E. C. BITZER 91
Inco Tells What It Takes To Open Up an Orebody ... 96
How Synchronous Motors Improve Plant Power Systems ... 99
This Month in Mining ... 102
Personal News ... 114
Washington Impact ... 108
New Products Digest ... 123
Operating Ideas ... 110
New Books ... 128

ALFRED M. STAEHLE, Publisher — **EVAN JUST, Editor** — **R. H. RAMSEY, Executive Editor**

A. H. HUBBELL, Managing Editor; Associate Editors: J. B. HUTTL, San Francisco, A. W. KNOERR, H. L. WALDRON; Market Editor: H. H. WANDERS; Layout Editor: F. A. ZIMMERLI; Consultant: G. J. YOUNG; Washington: ARTHUR MOORE.

R. W. DAVIS, Advertising Sales Manager

Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder. Publication Office, 1309 Noble St., Philadelphia 23, Pa. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Engineering and Mining Journal — Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 18, N. Y. Allow ten days for change of address.

Branch Offices: San Francisco 4, 68 Post St.; Chicago 11, 520 N. Michigan Ave.; Los Angeles 17, 1111 Wilshire Blvd.; Washington, D. C.; National Press Bldg.; Pittsburgh 22, 719 Oliver Bldg.; Detroit 26, 856 Penobscot Bldg.; Cleveland 15, 1510 Hanna Bldg.; Boston 16, 1427 Statler Bldg.; Philadelphia 3, 17th and Sansom Sts.; Atlanta 3, 1011 Rhodes-Haverty Bldg.; St. Louis 8, Continental Bldg. District Managers: New York, T. H. Alcorn; New York and New England, S. Kennedy; Philadelphia, W. A. Potter; Cleveland, W. M. Spears; Pittsburgh, H. C. Chellson; Chicago, C. J. Cousb; San Francisco, J. W. Otterson; Atlanta, R. C. Maultsby; Los Angeles, C. W. Dysinger; St. Louis, F. W. Roets. London Address: McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C. 2, England. Cable address: McGraw-Hill, London. Other McGraw-Hill foreign news offices in Paris, Berlin, Moscow, Prague, Shanghai and Mexico City.

A McGRAW-HILL PUBLICATION

ABP ABC

Member of Associated Business Publications and Audit Bureau of Circulations

Price of this issue, 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Canada, Latin America and the Philippines, $5 a year, $8 for 2 years, $10 for 3 years. Elsewhere $15 a year, $25 for 2 years, $30 for 3 years. Please indicate position and company connection in all subscription orders.

Entered as second class matter May 24, 1951, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879. Copyright 1951 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Printed in U. S. A.

ASSURE STARTS.

. . . for every type of mine car, with TEXACO OLYMPIAN GREASE

LUBRICATE your mine cars with *Texaco Olympian Grease,* and they will start easier, roll smoother—*all winter long!* You'll haul more tonnage . . . be better able to keep abreast of rising military and civilian demands. At the same time, you'll be making a saving because *Texaco Olympian Grease* assures longer bearing life . . . lower maintenance costs.

Texaco Olympian Grease stays *in* the bearings (plain, cavity hub or anti-friction), seals out dirt and moisture. *Texaco Olympian Grease* resists oxidation . . . will not separate in service or in storage. Cost-saving *Texaco Olympian Grease* is available in three consistencies to meet all requirements.

Bring down maintenance costs on open gears and wire rope by using *Texaco Craters.* For gears, *Texaco Crater X Fluid*—goes on as a liquid; stays on as a tough, long-lasting, protective film. For wire rope, *Texaco Crater A*—protects strands and core . . . keeps rope strong longer.

Let a Texaco Lubrication Engineer help you boost production and cut costs throughout your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

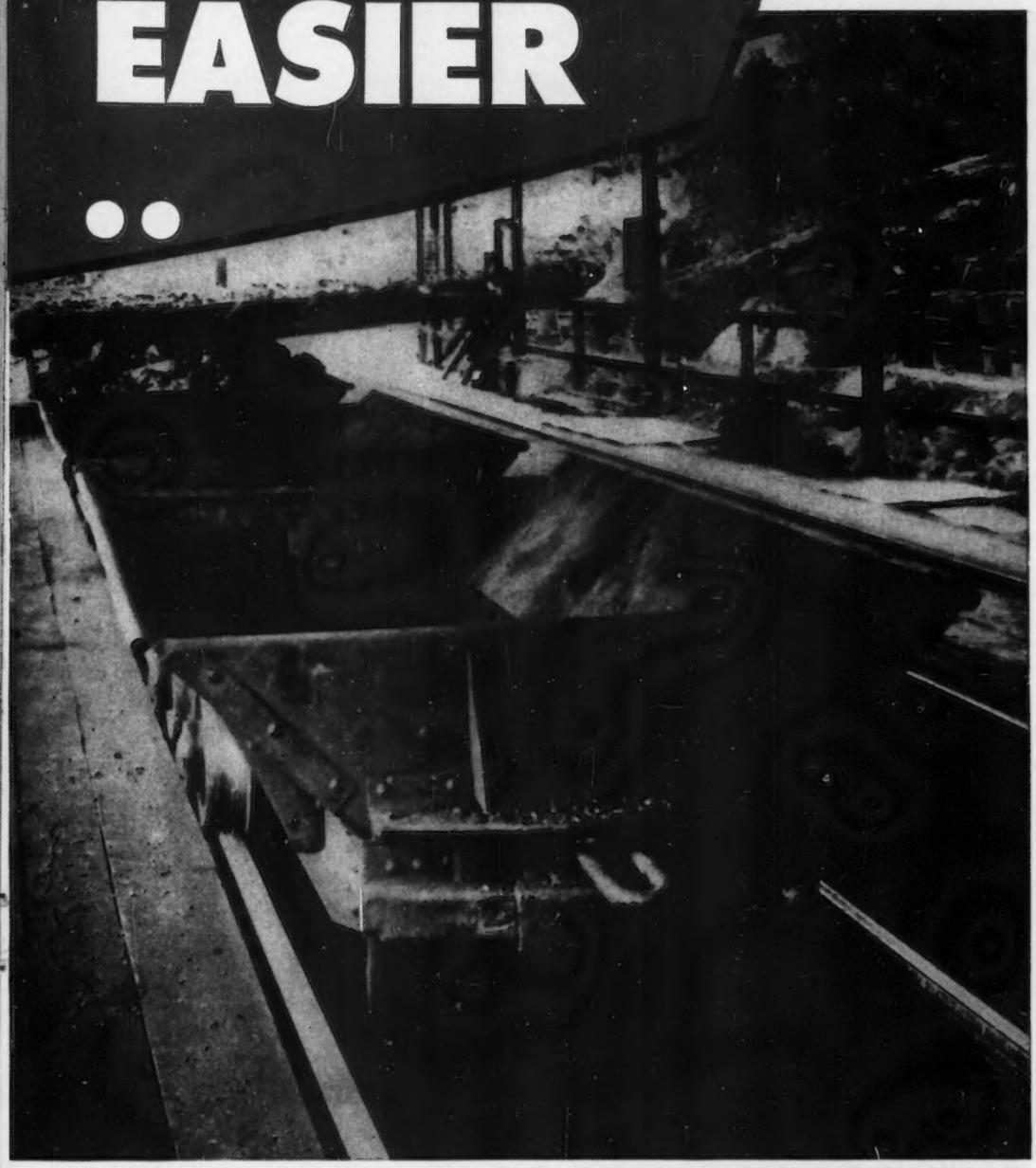
MORE COPPER MINING EQUIPMENT IN THE U. S. IS LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND.

TUNE IN . . .
TEXACO STAR THEATER
starring
MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

TEXACO

TEXACO

EASIER



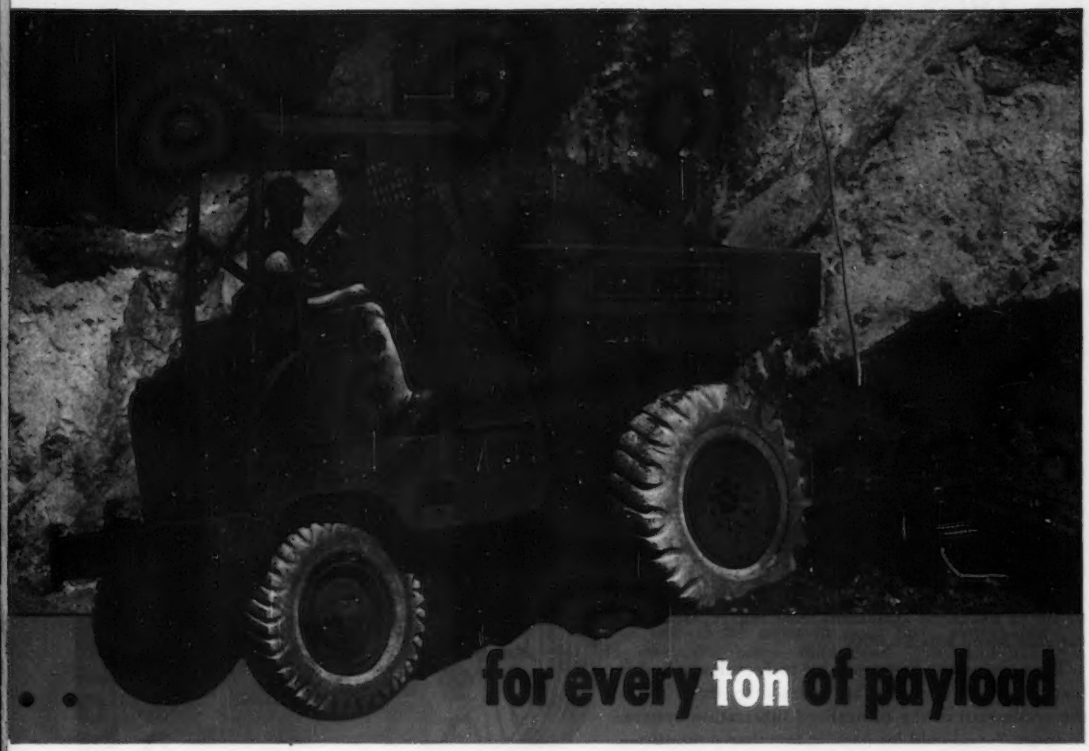
Lubricants and Fuels

FOR THE MINING INDUSTRY

A TON OF DUMPTOR STRENGTH .

FAST, EASY SPOTTING . . . In confined underground operation, Dumptors spot fast, close to shovel . . . no need to turn. Big flared 8' x 8' body permits loading over end or sides. Shovel operator has easy-to-hit target, less spillage, short swing.

NO-TURN SHUTTLE HAUL . . . Dumptors travel same speed forward and reverse . . . save slow jockeying back and forth at the loading unit, on the haul, at the dump. Yet, Dumptors have plenty of maneuverability . . . turn in a tight circle of 19'-6" radius.



. . for every ton of payload

TO stand up under the most severe loading shocks of mine, quarry and construction service, Koehring Dumptors have more than a ton of net vehicle weight for every ton of payload. Sides, end and bottom of all-welded 6-yard body are heavily reinforced with 4" channel ribs. More than triple strength built into the bottom cushions shocks of rock loading. Seasoned 1⅝" oak timbers are securely bolted between two layers of 5/16" steel plate. Free-swinging kick-out pan adds another tough 3/16" high-manganese steel plate to Dumptor bottom for extra protection.

To withstand punishment of rough, off-road hauling, there's plenty of strength, too, in the heavy-duty chassis. Dumptor has rugged main frame of 8" ship channels, heavily trussed . . . 1-piece steel drive-axle housing and transmission case . . . 4" chrome steel drive axles . . . cast alloy steel "I" beam steering axle. There are no leaf springs . . . just one big, double-coil chassis spring on steering axle . . . none on drive axle. Big, shock-absorbing drive tires eliminate need for more. That means no spring maintenance.

For fast acceleration, less shifting, more grade-ability, Dumptors also have 6 HP for every ton of gross weight . . . climb grades up to 24% fully loaded. Learn, too, how 1-second gravity dump eliminates body hoist maintenance . . . saves 15 to 25 seconds on every cycle with Dumptors. Get all the facts from your Koehring distributor.

KOEHRING Company
Milwaukee 16, Wis. K126

KOEHRING (KOEHRING HEAVY DUTY) **DUMPTOR®**

Farval system on crusher pays for itself in 4 months

IN March, 1949, a Farval Automatic Lubrication System was installed on this Fairmount roll crusher in an eastern Pennsylvania plant. Noteworthy savings were evident immediately—in grease consumption, oiling labor and bearing expense.

Before Farval, 25 pounds of grease was used to lubricate the crusher every 8-hour shift. Now grease consumption is less than 10 pounds per shift. This represents a cost saving of $1,086 per year on lubricant.

Before Farval, it took one man's time to lubricate the crusher and keep the floor clean. Now a man from the Hammer Mill floor below comes up to the crusher occasionally, merely to check the Farval system and sweep the floor. This represents a saving on labor of between $2,500 and $3,000 a year.

Before Farval, a set of crusher bearings lasted only a year. After the Farval system had been in service 12 months, an inspection of the bearings showed them to be in excellent condition. Bearing replacement expense saved was $1,000.

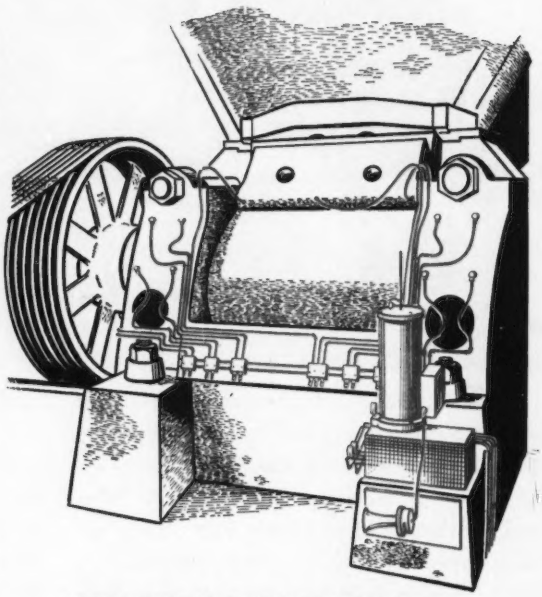
Thus saving the first year, due to Farval, totalled at least $4,500—considerably more than three times the entire cost of the centralized lubrication system. In short, Farval paid for itself in less than 4 months—and now pays dividends in savings at the rate of $375 a month.

Farval is the original Dualine system of centralized lubrication that has proven itself through more than 20 years of service. The Farval valve has only two moving parts—is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, Farval unfailingly delivers grease or oil to each bearing—as much as you want, exactly measured—as often as desired. Indicators at every bearing show that each valve has functioned.

Write for Bulletin No. 25 for full details. The Farval Corporation, 3281 E. 80th St., Cleveland 4, O.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.

FARVAL—*Studies in Centralized Lubrication* No. 120



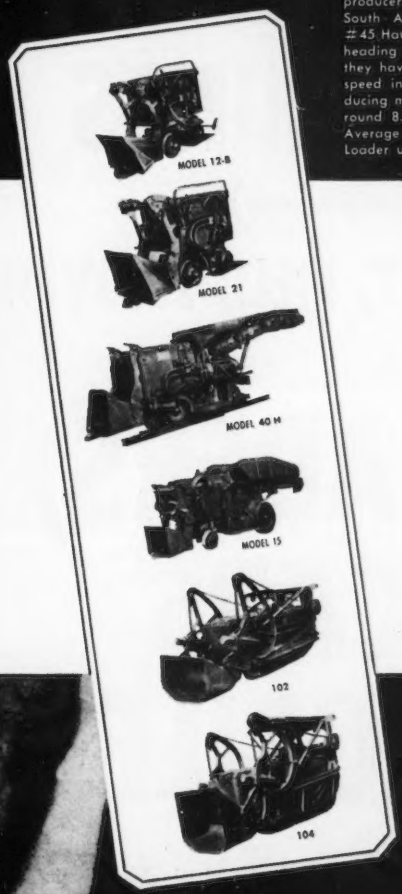
$4,500 saved the first year! Monthly savings since then of at least $375! That's the report in this case of a Farval-protected Fairmount roll crusher. Farval is giving similar valuable protection to the equipment in thousands of other industrial plants.

CASE HISTORY OF A SUCCESSFUL TUNNEL JOB

FROM THE EIMCO FILE T1005A

GROOTVLEI TUNNEL

Grootvlei Proprietary Mines, a gold producer on the Far East Rand in South Africa, were driving their #45 Haulage Way a 12½ x 10'10½" heading and, because so efficient they have established a record for speed in tunnel driving in a producing mine. Average footage per round 8.20'; Rounds per day 5.3; Average footage per day 43.5. Loader used—Model 40H Eimco.



World-wide acceptance of the Eimco RockerShovel has expanded the Eimco organization in all directions to sales as well as service in the remote sections of the friendly countries of the world.

Eimco equipment is being used in more than fifty foreign countries, to say nothing of the many small islands where mining is being done.

Some places are using Eimco's that have had to pack them in, piece by piece, carried on the shoulders of natives. In other remote, and only partially explored, sections Eimco's are being used by native operators.

In many of these districts, different types of loading equipment were taken in for a comparative test before the company would buy any considerable quantity of the machines, and in every case Eimco's were chosen for standard equipment.

RockerShovels had to be good to gain their world-wide acceptance—today they are better than ever. You can't beat an Eimco.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

NEW YORK 51-52 SOUTH STREET • CHICAGO 3319 SOUTH WALLACE STREET
BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIFORNIA, P. O. BOX 240
KELLOGG, IDAHO, 307 DIVISION STREET

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

MECHANIZATION in BIRMINGHAM MINES

(Just as in mining areas <u>everywhere</u>)

IS BUILT AROUND EFFICIENT, FIELD-PROVED

JOY LOADERS, SHUTTLE CARS and DRILLMOBILES

When mining engineers in the Birmingham district saw the need for mechanized methods to decrease costs and increase profits, they turned to Joy for their equipment answers. The Joy 18-HR-1 Loader and 60-E Shuttle Car, hard-rock versions of Joy's successful coal-loading teams, furnished the necessary speed and capacity for high-production loading and haulage.

A later refinement of the loader, the Joy 18-HR-2, is now being used extensively in the area. Its 12-ton-per-minute loading capacity permits the fastest possible movement of ore from the face. Like the loader, the Joy 60-E Shuttle Car is specially designed for the rugged duty of ore and rock handling with a minimum of maintenance.

Another machine helping to reduce costs in Birmingham mines and other mining areas is the rubber-tired Joy Drillmobile. It moves in and out fast, sets up quickly, assures drilling your rounds in minimum time and at least cost per foot of hole. ● Let us help you apply Joy Equipment to *your* conditions.

Have You seen this film?

"HARD ROCK MECHANIZED MINING"

in Sound and Full Color

★

Available for Free Showings on Request

Address: Film Booking Dept.

JOY MANUFACTURING COMPANY

Oliver Bldg., Pittsburgh 22. Pa.

World's Largest Manufacturers of Underground Mining Equipment

One of the Joy continuous-type trackless loaders operating in the Birmingham Mining district, shown above loading hard, abrasive material into a Joy 60-E Shuttle Car. Controls are grouped for easy, one-man operation.

The self-propelled Joy Drillmaster is a fast-tramming, highly maneuverable machine, available in three sizes to suit any conditions. Drills are mounted on Joy Hydro Drill Jibs, which make hole-positioning easy and accurate, and permit remote control for utmost safety.

The 60-E, below, is a cable-reel operated car, easily handled and highly maneuverable.

Other JOY EQUIPMENT used in the BIRMINGHAM DISTRICT

STATIONARY AND SEMI-PORTABLE AIR COMPRESSORS—Models to deliver from 1.6 to 3656 C.F.M.

MINE-AIR COMPRESSORS—Self-propelled or draw-bar models in capacities from 130 to 240 C.F.M.

ROOF BOLTING STOPERS—Specially designed for roof bolting under most mining conditions.

CONTINUOUS MINERS—For efficient, low-cost mining in high or low coal.

TRACKLESS COAL CUTTING MACHINES—Rubber-tired, self-propelled universal cutters for all needs.

LOADING MACHINES FOR COAL—High capacity continuous-type loaders in models for all seam thicknesses.

SHUTTLE CARS FOR COAL—Easily-handled, highly maneuverable units for high capacity haulage.

CHAIN CONVEYORS—Compact and efficient, designed for long and continuous service with minimum maintenance.

SHAKER CONVEYORS—Compact sections with "Cushion Stroke" drive to handle any room and entry conditions.

Consult a Joy Engineer

WRITE FOR COMPLETE INFORMATION ON ANY OF THE ABOVE EQUIPMENT

W&D M3369

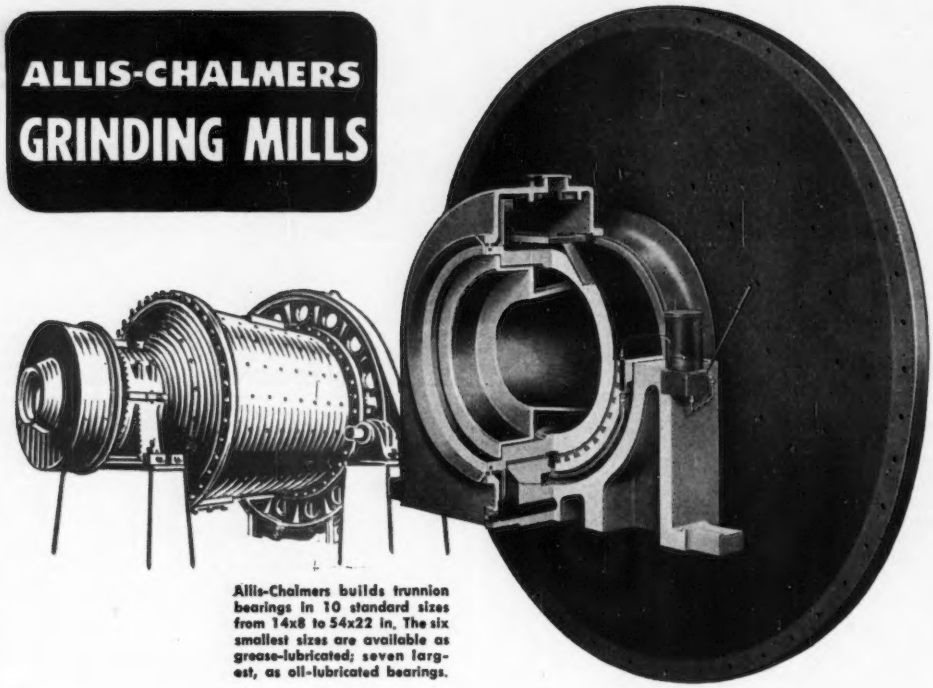
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Trunnion Bearing Engineered to End Alignment Troubles

ALLIS-CHALMERS
GRINDING MILLS



Allis-Chalmers builds trunnion bearings in 10 standard sizes from 14x8 to 54x22 in. The six smallest sizes are available as grease-lubricated; seven largest, as oil-lubricated bearings.

BALL AND SOCKET design of this Allis-Chalmers trunnion bearing provides a spherical seat that corrects for *any* minor misalignment of mill and bearing. Load is always distributed evenly across the full face of the bearing.

A complete, self-enclosed oiling system is contained in the bearing housing. Soft babbitt cannot score polished trunnion surface.

Large oil-lubricated trunnion bearings are provided with a hand-operated lubricant pump for floating the mill prior to starting. This eliminates high starting torque, an important feature, since 75 percent of bearing wear occurs during initial starting after shut-down. Motor inrush current is decreased.

Allis-Chalmers builds trunnion bearings in lengths approximately one-half the diameter, in agreement with the latest engineering trend. Ample bearing area keeps bearing pressure low, prolongs bearing life.

The Allis-Chalmers representative in your area can give you more facts about bearings and other features of Allis-Chalmers grinding mills. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3479

Pulverator is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators | Vibrating Screens | Jaw Crushers | Motors | Gyratory Crushers | Kilns, Coolers, Dryers

You can't have all NORTHWEST ADVANTAGES unless you own a NORTHWEST

Northwest positive traction while turning as well as when going straight ahead permits Northwests to travel where others have difficulty. Travel gears are fully enclosed and run in oil.

Uniform Pressure Swing Clutches give smoother engagement, better control, less adjustment and longer life.

Northwest Dual Independent Crowd utilizes force other independent crowd shovels waste! Northwest Shovel Boom is powerful—all welded—proved in rock digging!

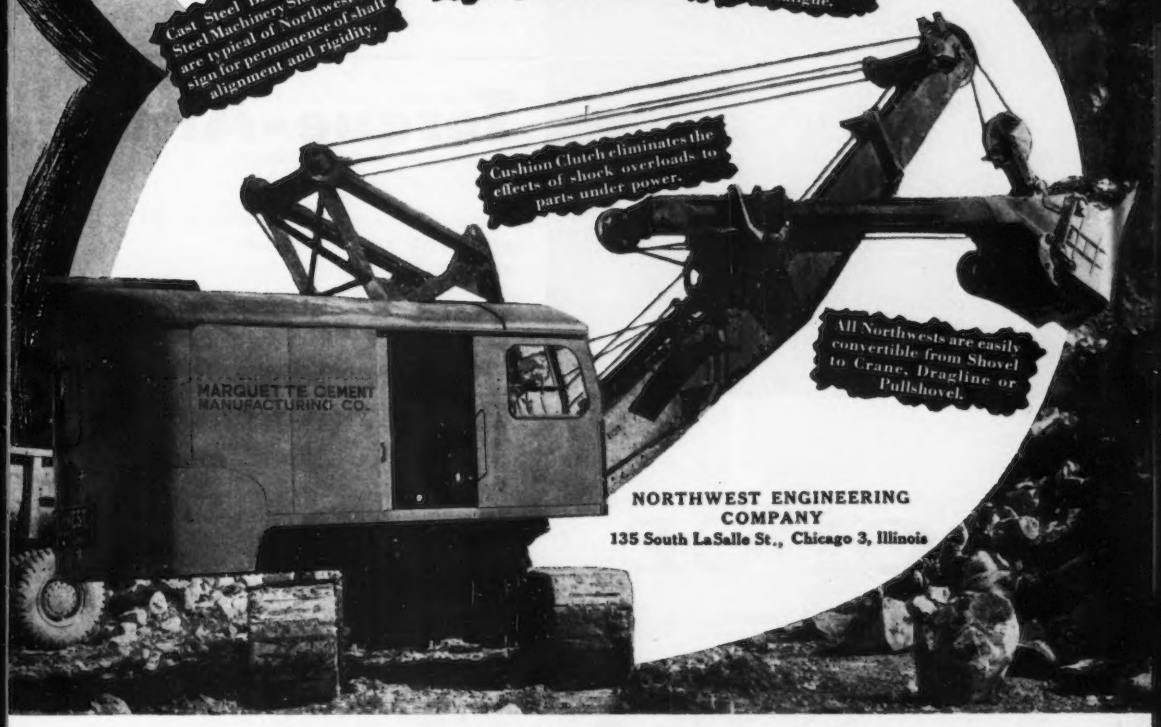
Ball and roller bearings on all high-speed shafts always have been standard equipment on Northwests.

"Feather-Touch" Clutch Control utilizes engine power to throw heavy clutches and reduces day-end fatigue.

Cast Steel Bases with Cast Steel Machinery Side Frames are typical of Northwest design for permanence of shaft alignment and rigidity.

Cushion Clutch eliminates the effects of shock overloads to parts under power.

All Northwests are easily convertible from Shovel to Crane, Dragline or Pullshovel.



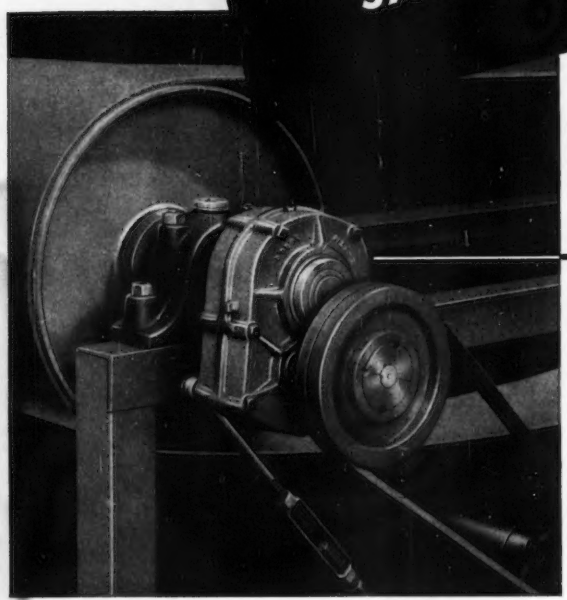
NORTHWEST ENGINEERING COMPANY
135 South LaSalle St., Chicago 3, Illinois

NORTHWEST ENGINEERING COMPANY
1509 Field Building • 135 South LaSalle Street • Chicago 3, Illinois

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

THE SPEED REDUCER THAT SAVES YOU MONEY!



Dodge

Torque-Arm

America's Most Complete Line of Shaft-Mounted Speed Reducers

- No special engineering required. No foundation to provide. No flexible couplings. No sliding base. No "lining-up" difficulties. No expensive installation. Stock TAPER-LOCK sheaves prescribed for each job to provide desired speeds. Application to other machines is practical and easy.
- Unit is driven through any V-Belt Drive. Torque-arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Simple. Positive. Easily installed. Sealed inside the reducer housing.
- Compact, light weight, *rugged*. Quality built by Dodge for Dodge *dependable* service.
- Built in two series—Single and Double Reduction. Capacities from 1 to 27 h. p. Speeds from 12 to 330 rpm. Available from distributors' stocks.
- WRITE for special bulletin A602.

DODGE MANUFACTURING CORPORATION, 3100 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!

V-BELTS AND TAPER-LOCK SHEAVES

DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND D CLUTCHES

SOLID STEEL CONVEYOR PULLEYS

Here's what WE mean by

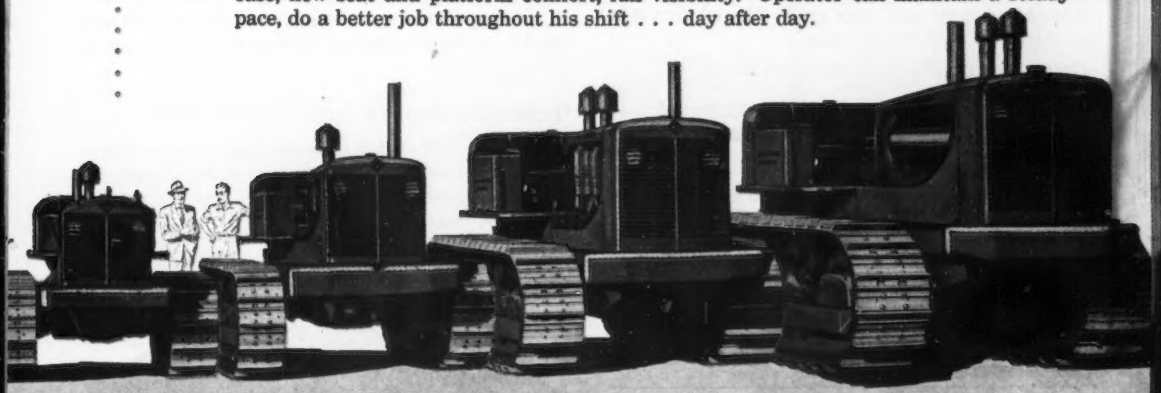
The Newest, Finest Tractor Line on Earth!

DESIGNED FOR YOUR JOB These Allis-Chalmers tractors are *new from the ground up* . . . without compromise anywhere in design or material. They are built to give you outstanding performance on any job, with any equipment—drawn or mounted. Fully matched line of Allied equipment!

BUILT TO "TAKE IT" These are the finest tractors ever built . . . with ample capacity and strength in every part! You can depend on them to take the loads and jolts of today's jobs . . . because they are modern tractors built for the most gruelling operating conditions. They will more than measure up to your expectations!

EASY TO SERVICE Adjustments are easier . . . lubrication simplified and lube periods greatly extended. Mechanics say these tractors are the easiest to service and repair. This all adds up to less down time, more producing time . . . longer tractor life at less upkeep cost.

EASY TO OPERATE Conveniently located controls respond to the slightest effort . . . and are operated in the same familiar way—nothing tricky to "catch on to." There is new shifting ease, new seat and platform comfort, full visibility. Operator can maintain a steady pace, do a better job throughout his shift . . . day after day.



HD-5
40.26 drawbar hp.
11,250 lb.

HD-9
72 drawbar hp.
18,800 lb.

HD-15
109 drawbar hp.
27,850 lb.

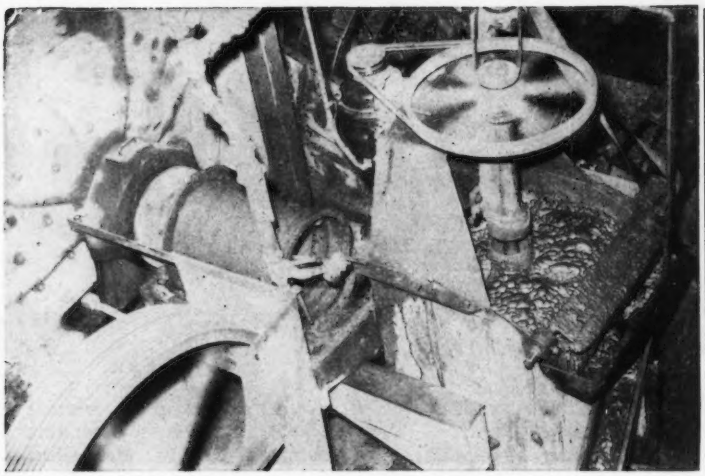
HD-20
Hydraulic Torque Converter Drive
175 net engine hp. 41,000 lb.

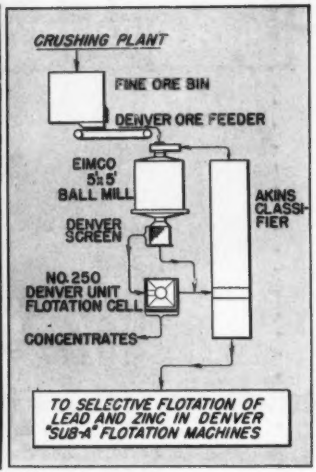
YEARS AHEAD

Each of these new Allis-Chalmers crawlers gives you a new yardstick for rating tractors. Each sets new standards in its class for performance, strength, servicing, operation. Get the full story from your Allis-Chalmers dealer NOW on this — The Newest, Finest Tractor Line On Earth.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.





How Silver Standard Mines Ltd.* Recovers 65% of Lead As Soon as Free... Using Denver "Sub-A" Unit Flotation Cell

HERE ARE THE FACTS

65% of total lead concentrate shipped is recovered in a No. 250 Denver "Sub-A" Unit Flotation Cell.

Unit Cell concentrate contains 55% of the silver and 68% of the lead recovered in the combined lead concentrates. In general, Unit Cell concentrate is considerably coarser and more easily filtered than that produced by lead cleaner cells.

FEED DENSITY RANGES FROM 55% TO 65% SOLIDS.

SCREEN ANALYSIS OF UNIT CELL FEED

	+48 mesh	35.5% by weight
—48	+65 mesh	15.7% " "
—65	+100 mesh	13.9% " "
—100	+200 mesh	14.7% " "
	—200 mesh	20.2% " "

ASSAYS:	Au	Ag	Pb	Zn
Mill feed	.10 oz.	45.0 oz.	5.0%	10.0%
Unit Cell Concentrate	.50 oz.	400 oz.	58%	9%
Pb Cleaner Concentrate	.70 oz.	600 oz.	50%	12%
Combined Pb Concentrate	.60 oz.	470 oz.	55%	10%

*Silver Standard Mines, Limited, New Hazelton, B. C., Canada

RECOVER COARSE MINERAL— REGRIND MIDDLINGS

Any processing after recoverable minerals have been liberated is *unnecessary, costly and old-fashioned metallurgy.* There IS a better way!

Two mill-proven machines recover minerals as soon as freed in grinding circuit: Denver "Sub-A" Unit Flotation Cell and the Denver Selective Mineral Jig. *Both warrant your serious investigation.*

HOW TO ESTIMATE YOUR ADVANTAGES

Simple Ore Tests will tell: (1) particle size where mineral is freed; (2) Amount and grade of concentrate; (3) size and cost of equipment required. Your low cost for ore tests will be sent on request. No obligation.

WRITE FOR THESE BULLETINS

Bulletin No. F12-B, Denver "Sub-A" Unit Flotation Cell
Bulletin No. T4-B10, How to Schedule An Ore Test
Bulletin No. J2-B8, Denver Selective Mineral Jigs

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEER

DENVER • NEW YORK • CHICAGO • EL PASO
TORONTO • VANCOUVER • MEXICO, D. F.
LONDON • JOHANNESBURG • RICHMOND, AUST.

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY
1402 SEVENTEENTH STREET • DENVER 17, COLORADO

U-5111

"CAT" BULLDOZER...

America's all-purpose tool!

Working at a molybdenum mine near Climax, Colorado, which produces most of the world's molybdenum, these "Cat" D7s with No. 7S 'Dozers are feeding ore into hole leading to mine tunnel. They also operate dragline in the mine tunnel. Their ability to slug into a job and finish it on schedule is particularly important here, for molybdenum is used to strengthen steel and to produce alloys important to national defense.

THESE "Caterpillar" D7 Tractors with matching No. 7S blades are 'dozing molybdenum in a mine near Climax, Colorado. Their tough 'dozers take a constant beating from rocky abrasives; but their record has made owner Robert Ryan of Lakewood, Colorado, one of the best "Caterpillar" boosters in the Rockies.

These machines give you blade and tractor *built* to work together. This rugged team is a bear at meeting work schedules. Sturdy construction and quality materials enable it to keep punching full time without time out for tinkering, and the special steel cutting edge of the blade hammers through the toughest going. Most important of all, the precision methods used in "Caterpillar" factories build extra years of life into these highly maneuverable bulldozers.

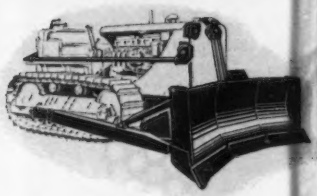
For help with your equipment problems, see your "Caterpillar" dealer *now*. Today's expanding military program has high priority. But it is recognized that our national preparedness depends upon stepped-up civilian production too. So your "Caterpillar" dealer is especially interested in meeting your needs—through equipment replacement and by exercising his working partnership with you to keep the machinery you have *on the job*.

CATERPILLAR, PEORIA, ILLINOIS

• • •

"CATERPILLAR" BULLDOZER EXTRA FEATURES

1. Tractor and 'dozer *broken to harness*, and a size for every need.
2. Moldboard curvature for active, *rolling*, higher production loads.
3. Box section side arms — extra thick at points of greatest stress.
4. Choice of straight or angling type of blade, simple to maneuver and easy to adjust or detach.
5. Your choice of hydraulic or cable controls.
6. The power of the "Caterpillar" Diesel Engine is geared to blade *capacity*.



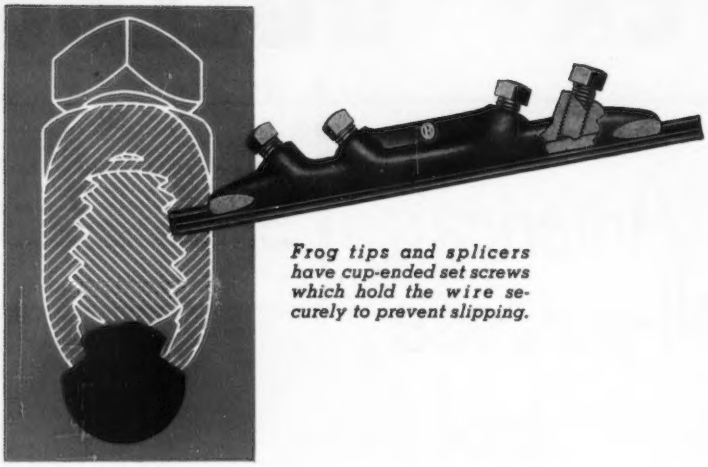
New Addition to 'Dozer Line

Here's a specialist that can step up production and cut costs. It's the brand new No. 8U 'Dozer for use with the "Caterpillar" D8 Tractor with cable control. Working best in loose or light material, the end portions of the blade extend forward, giving it a flat U shape. This enables it to drift large loads without spillage, making it possible to bulldoze longer distances for bigger production. The No. 8U is built to the same high standards of strength and long life as the other "Caterpillar" Bulldozers. The versatility of this new tool gives it excellent performance on all kinds of 'dozing jobs, from stockpiling to pioneering.

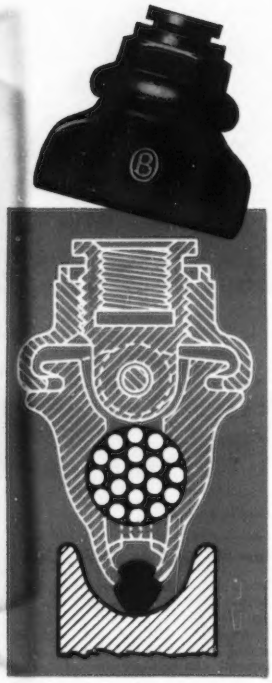
CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



Frog tips and splicers have cup-ended set screws which hold the wire securely to prevent slipping.



Bulldog Dual Clamps suspend feeder and trolley in one hanger.

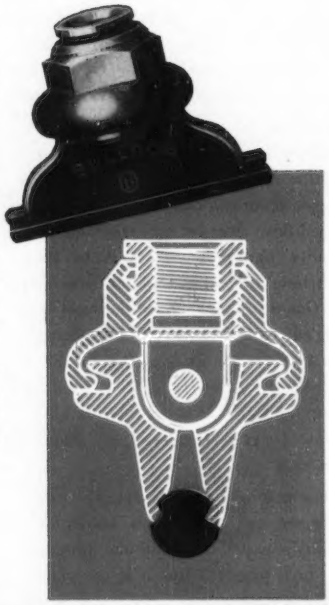
A GOOD GRIP

Keeps Trolley Wire In Place

One of the first things you look for in wire-holding hardware is a good, strong grip. That's your assurance of a trolley wire, once hung, that will stay in place. Replacing a loose or fallen wire is not so costly in itself—it's the delayed production that hurts, and you want a wire installation that isn't going to require constant maintenance.

O-B High Mileage Trolley Wire Fittings keep your wire up, hold it tight, and do so without interference to the current collector. Cross sections of several O-B wire-holding fittings shown here demonstrate their firm, lasting hold on the trolley, and show the ample clearance for your current collector.

There's an O-B fitting for every trolley wire support purpose along your haulage way. Standardize on them for a trolley wire installation that stays up until *you* take it down.



Bulldog clamps can be adjusted to any desired holding strength. Ample collector clearance is evident.

Ohio Brass

MANSFIELD OHIO, U.S.A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

6103-M

This advertisement appeared in leading newspapers September 12. It is the first of a series in behalf of a modern highway system.

We Must Face the Highway Crisis Now

—*there is only one real cure!*

ONE of the greatest home-front threats to the welfare of every American is the congestion on our highways today.

It is not only a menace that costs thousands of lives in needless accidents and millions of dollars in wasted time every year—*it is a peril to national security!*

Without motor transportation the nation would stagnate. It has become the lifeblood of America's economy. The highways are its arteries—and they are hardening fast!

Remember these facts

Motor transport now carries 80% of all interstate passenger traffic — takes more than 50% of all workers to their jobs.

It speeds 90% of all foods to market—hauls 75% of all general freight.

It is the swift plant-to-plant conveyor of raw materials, parts and subassemblies that keeps America's mass-production lines going—that makes America's unprecedented prosperity possible.

Roads are the bottleneck

To keep America moving today requires the daily use of almost FIFTY MILLION motor cars, trucks and buses —more motor vehicles than all the rest of the world possesses!

Yet this vital transport system is now jam-packed into an obsolete highway system—*most of it designed pre-war to comfortably accommodate less than half today's vehicular mileage!*

And motor registrations have been soaring since the war at the rate of 3.7 million per year.

We should have action NOW!

We cannot cut this Gordian knot by restrictive laws. The crux of the problem is not the number of cars or the size of trucks—*it is too few modern roads!*

To keep our nation mobile, we must start building a new national highway system now, designed for modern traffic needs and speeds.

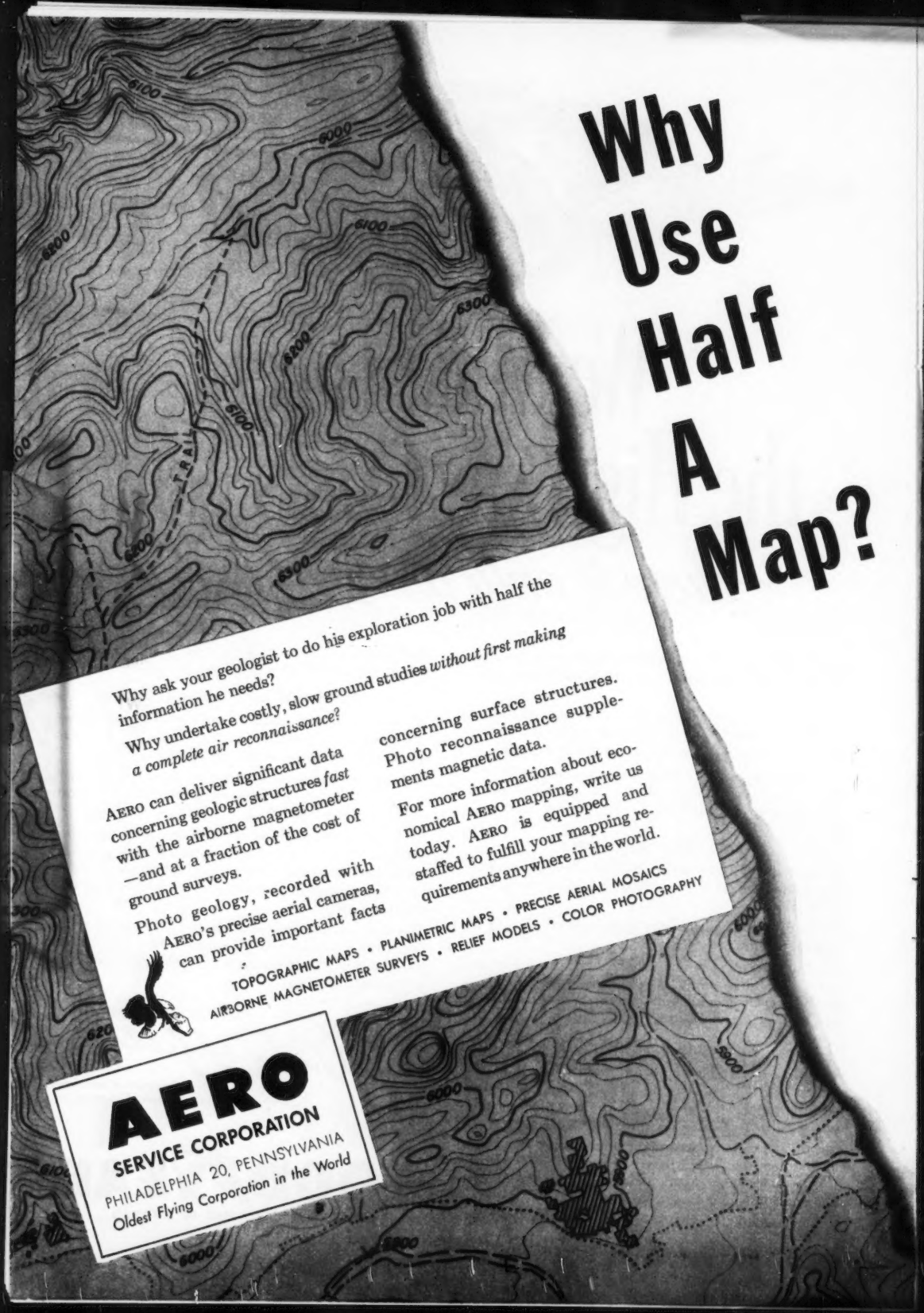
Such a modern road system is essential to our prosperity and vital to our defense in this atomic age. And we have the world's most efficient road-building industry equipped to construct it in less time than ever possible before.

The time has come when we must do something about better roads besides talk. The demand for action must come from everyone who uses the highways—and that's just about everybody.

P. W. Litchfield

Chairman of the Board
THE GOODYEAR TIRE & RUBBER COMPANY, INC.

GOODYEAR
THE GREATEST NAME IN RUBBER



Why Use Half A Map?

Why ask your geologist to do his exploration job with half the information he needs?

Why undertake costly, slow ground studies *without first making a complete air reconnaissance?*

AERO can deliver significant data concerning geologic structures *fast* with the airborne magnetometer —and at a fraction of the cost of ground surveys.

Photo geology, recorded with AERO's precise aerial cameras, can provide important facts concerning surface structures. Photo reconnaissance supplements magnetic data.

For more information about economical AERO mapping, write us today. AERO is equipped and staffed to fulfill your mapping requirements anywhere in the world.

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS • PRECISE AERIAL MOSAICS
AIRBORNE MAGNETOMETER SURVEYS • RELIEF MODELS • COLOR PHOTOGRAPHY

AERO
SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA
Oldest Flying Corporation in the World

Bear Brand Xanthates bring . . .

. . . Universal Adaptability

BEAR BRAND XANTHATES

available

- Z-3—Potassium Ethyl Xanthate
- Z-4—Sodium Ethyl Xanthate
- Z-5—Potassium Amyl Xanthate*
- Z-6—Potassium Pentasol Amyl Xanthate*
- Z-8—Potassium Secondary Butyl Xanthate
- Z-9—Potassium Isopropyl Xanthate
- Z-11—Sodium Isopropyl Xanthate

*From Sharples Amyl Alcohols

Extremes in climatic conditions do not adversely affect the quality and usefulness of Bear Brand Xanthates.

From the frigid zone to the tropics, years of extremely diversified operating experience have conclusively demonstrated that optimum economic and metallurgical results are achieved by the use of Bear Brand Xanthates.

Time and experience have demonstrated the universal adaptability of these outstanding reagents to the successful flotation treatment of practically all sulphide ores, as well as some oxidized ores and certain ores containing native metal.

"Over Twenty-five Years Experience in Producing Xanthates for Metallurgical Use"

THE DOW CHEMICAL COMPANY
San Francisco 4, California, U. S. A.

DOW CHEMICALS

Specialized Treads!

Now for the first time, truck operators can have a tire that meets the most severe demands of *specialized on-and-off-the-road* tire work—the U. S. Royal Fleetmaster! It's specially designed and compounded to give *sharp penetration* and *super traction off the road* PLUS *smooth-rolling, non-skid mileage* when you pull up *onto the highway!*

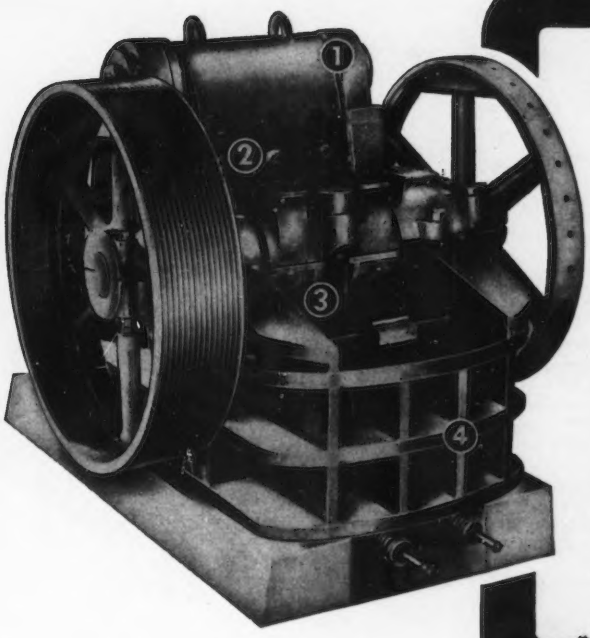
These are the Fleetmaster Facts!

- ★ *70% deeper traction tread!*
- ★ *Tougher, stronger carcass! (More Recaps)*
- ★ *Job-fitted tread compounds!*
- ★ *Thicker under-tread!*
- ★ *Round-molded to the tire's inflated shape to reduce distortion stress and strain!*

See the new Fleetmaster at your nearest U. S. Royal Dealer. **A phone call does it.** He's listed in the Classified Telephone Book.

UNITED STATES RUBBER COMPANY

Four construction features make A Traylor HB Jaw Crusher *best* for increased ORE production



SWING JAW SHAFT is locked securely in both sides of the frame. Swing jaw works freely with less wear. This patented Traylor construction reinforces frame and reduces maintenance.

CURVED JAW PLATES, outwear conventional straight plates 3 to 1 . . . produce greater tonnages of a finer, more uniform, product with less power.

BULLDOG PITMAN of known strength employs a unique safety device to avoid possibility of serious breakdowns and delays.

REINFORCED, WELDED STEEL PLATE FRAME for exceptional strength without excessive weight. This facilitates transportation, handling and erection.

The Traylor HB Jaw Crusher has established enviable records for economical primary crushing of a wide variety of materials. In its wide range of sizes, up to 56" x 72", you will find a Traylor HB that is ideally suited to your primary crushing requirements. Get complete details on this advanced primary breaker by mailing the coupon today.

MAIL COUPON
For Free HB Jaw Crusher Bulletin

TRAYLOR ENGINEERING & MANUFACTURING CO.
404-A MILL ST., ALLENTOWN, PA.

Please send me full information that shows how the HB Jaw Crusher can reduce my operating costs.

Name _____

Company _____

Address _____

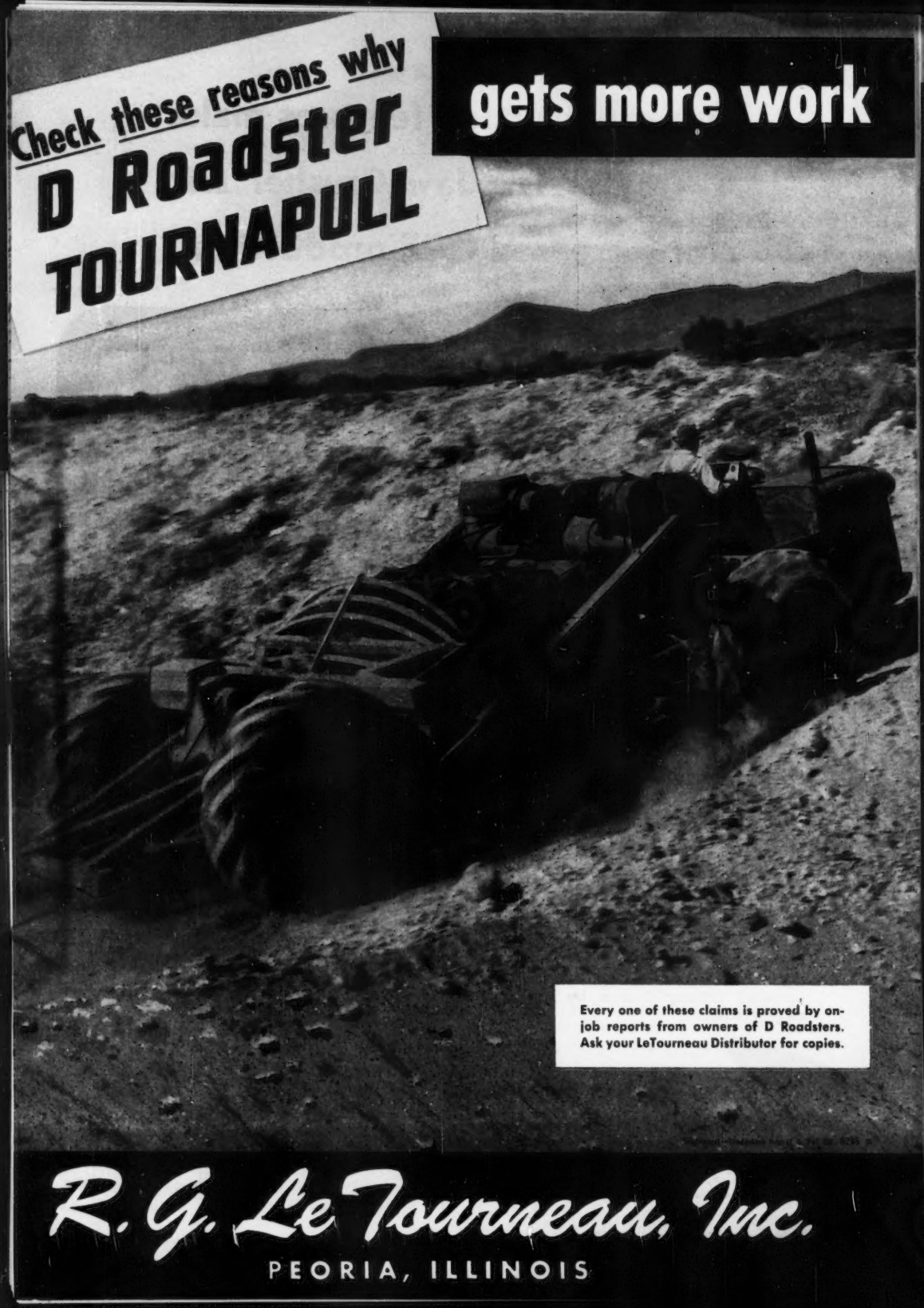
_____

SALES OFFICES: New York, N.Y.; Chicago, Ill., Los Angeles, Calif.
Canadian Mfrs: Canadian Vickers, Ltd, Montreal, P.Q.

Traylor

Rotary Kilns, Coolers and Dryers • Grinding Mills
Jaw, Reduction and Gyratory Crushers • Crushing Rolls

A "TRAYLOR" LEADS TO GREATER PROFITS


Check these reasons why
D Roadster
TOURNAPULL
gets more work
Every one of these claims is proved by on-job reports from owners of D Roadsters. Ask your LeTourneau Distributor for copies.
R. G. LeTourneau, Inc.
PEORIA, ILLINOIS

done at a lower net cost per job

① Modern rubber-tired speeds for fast digging and quick moves

This fast-stepping unit has a top speed of 28 m.p.h. You shift gears fast through the 5-speed, heavy-duty, sliding-gear transmission; has positive electric steer for accurate control and snappy maneuvering. You get big, fast tires instead of a crawler's tracks. With "D's" 28 m.p.h. speed, you get production and cost advantages on both long or short hauls as well as on odd-job maintenance and production dirtmoving assignments.

② Less downtime for weather, less slowdown for soft and slippery going

Big, low-pressure tires improve traction. Two-wheel prime mover wastes no tractive weight on extra steering wheels. Power-proportioning differential applies up to 4 times more power on wheel having firmest footing. Positive power steer shifts footing as needed for a better pull. All these speed up work cycles, cut downtime for bad weather.

③ Easier to keep busy, handles odd jobs or production dirtmoving

7-yard D Roadster is ready to go anytime at 28 m.p.h. to handle scattered one-machine jobs such as back-sloping, clearing slides and other small-yardage jobs. It's an excellent one-man road gang, can load and haul in surfacing, spread it to finished grade. Handy for drainage service too, and for clean-up at the mine. Tournapull is also an effective big-yardage dirtmover when pusher-loaded in fleet operation. This flexibility gives you more effective use of manpower and equipment for your maintenance, construction, and stripping operations. Both a Snow Plow and Bulldozer blade increase year-round application and make it best all-around production tool in your equipment inventory.

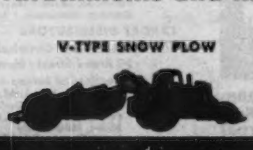
④ You save on job-to-job travel over pavement . . . cross country

Your operator drives the Roadster job-to-job over the highway under its own power (and carrying its own supplies). This saves cost of loading, blocking, trucking, low-boy, unloading, plus wasted waiting time. In addition, because the "D" can work-and-run to another one-machine assignment any time, any place, you can speed up maintenance service anywhere in adjoining pits . . . anytime of year. 25 miles is only about an hour away. Unlike crawler's tracks, big rubber tires do not damage road surface . . . they can also travel along or across tracks, over tressels, taking shortest route on jobs and between jobs.

⑤ Faster, easier to operate . . . less fatigue

Good operators are always available for the D Roadster. Push-button electric control makes it faster and easier to control. Big, low-pressure tires, air foam cushioned seat, plus quieter operation eliminate a lot of operator fatigue. This makes for safer, faster, steadier operation, less manpower turn-over. These advantages plus better operator co-operation mean a substantial increase in yards moved and more work completed throughout the year. Contact your LeTourneau Distributor for all the facts . . . there's no obligation.

Attachments and interchangeable EQUIPMENT:



Send for complete facts to: R. G. LeTOURNEAU, INC., Peoria, Illinois

Rush ☐ Specifications ☐ Price ☐ Job performance reports on 7-yd., 28 m.p.h. D Tournapull

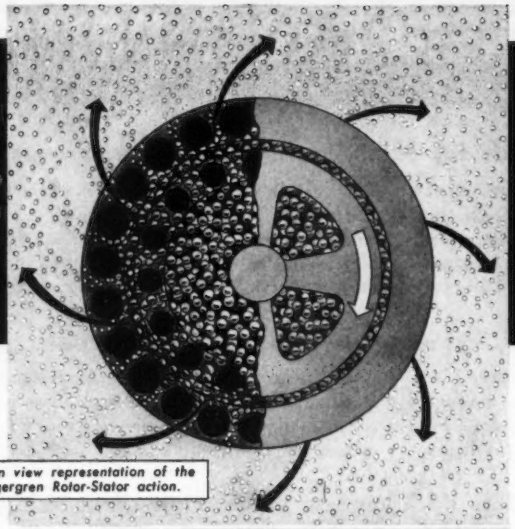
Name..... Title.....

Company.....

City..... State.....

Am also interested in "D" with: ☐ V-Type Snow Plow ☐ Bulldozer attachment ☐ Rear-Dump Hauler ☐ 7-ton Crane

LeTOURNEAU LeT EQUIPMENT



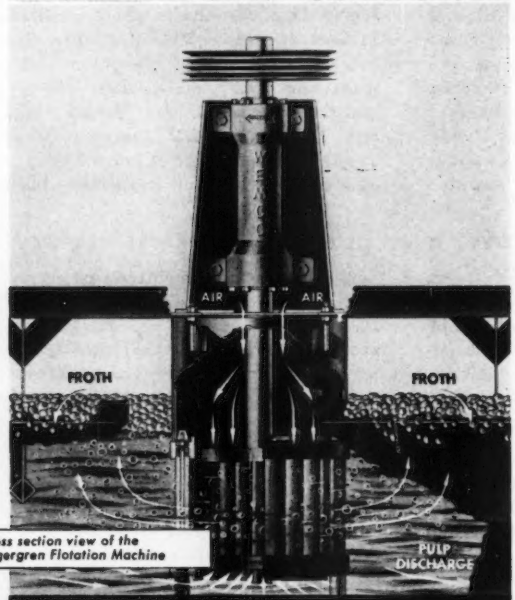
Plan view representation of the Fagergren Rotor-Stator action.

IMPROVED METALLURGY WITH FAGERGRENS

FIRST because there is more thorough contact between pulp and air.

SECOND because total bubble mineral attachment area is greater.

THIRD because "mineral dropping" action in the froth is nearly eliminated.



Cross section view of the Fagergren Flotation Machine

PROOF OF THESE FAGERGREN RESULTS, as compared with other type machines, is found in countless applications with a wide variety of ores. The **reason** for these results is explained by the action of the exclusive, patented rotor-stator.

THE POWERFUL AERATION OF PULP and the rapid, uniform dispersion of air accomplished by the Fagergren Rotor-Stator produce smaller, livelier bubbles of greatly increased surface tension. The larger number of **effective** bubbles thus produced results in superior mineral extraction and greater capacity per unit of cell volume.

REDUCED OPERATING COSTS also result from the rotor-stator principle since greater aeration and faster mineral removal lower reagent consumption **as much as 50%** and reduce power requirements. Machine operation is simpler, requiring less operating attendance, and long-life wearing parts cut maintenance.

WEMCO

WESTERN MACHINERY COMPANY

760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

MOBIL-MILLS	FAGERGREN & STEFFENSEN FLOTATION MACHINES	DEWATERING SPIRALS
COAL SPIRALS	FAGERGREN LABORATORY UNITS	AGITATORS
HMS THICKENERS	HYDROSEPARATORS	S-H CLASSIFIERS
HMS PUMPS	HMS LABORATORY UNITS	THICKENERS
DENSIFIERS		SAND PUMPS
CONE SEPARATORS		CONDITIONERS
DRUM SEPARATORS		

PRINCIPAL OFFICES

San Francisco • Sacramento • Salt Lake City • Spokane
Pocatello, Idaho • Denver • Phoenix • Chicago
Hibbing, Minnesota • Bartow, Florida • New York

EXPORT DISTRIBUTORS

- The Ore and Chemical Corporation
  80 Broad Street • New York 4, N. Y.

Continental Europe and North Africa

Dr. Ing. Herbert Lickfett, A/B, Stockholm 3, Sweden
S. E. M. U., 3 Rue Godot de Mauroy, Paris, France
Ferdinand Egeberg & Company, Oslo, Norway
Midec, Milan, Italy
Lurgi-Chemie, Frankfurt-Main, Germany
G. Maltsiniotis & Co., Athens, Greece
Agence Miniere & Maritime, S. A., Antwerp, Belgium
Adil Gabay & Albert Koenka, Istanbul, Turkey

- Fraser & Chalmers, (S. A.) Ltd. Johannesburg, South Africa
- Lilestone & Co., Inc., Manila, Philippines

Let's go...let's get that SCRAP in!

All your SCRAP is urgently needed, NOW

THE scrap shortage is serious. *Your* scrap—every pound of iron and steel scrap you can locate in your plant or factory—is vitally needed and needed right away. For unless you do everything possible to get this scrap on its way to the mills, steel production is bound to slow up. That can't be allowed to happen. But without your help it surely will.

It takes at least one-half ton of scrap to make one ton of steel. With the mills turning out more than 2 million tons of steel per week, over 1400 carloads of industrial scrap are needed *every day*. And industry, somehow, must provide it.

What you can do to meet this emergency

First, organize a permanent Scrap Salvage Committee and make the "drive-for-scrap" part of your daily operations. Search out every possible source of scrap. Turn your old and worn-out equipment, tools and machinery over to your scrap dealer, at once. Dig out your discarded dies, rusted-out tanks and boilers, your old rails and other miscellaneous junk, and start them back to the mills through your scrap dealer. Encourage every employee to report every retired or obsolete machine that now stands idle—see that it is turned in for scrap.

By getting this "dormant" scrap off your premises and into the furnaces you'll be helping not only yourself but America as well. *More* scrap turned in, means *more* steel turned out—it's as simple as that. So let's get going.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

U·S·S CARILLOY STEELS

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

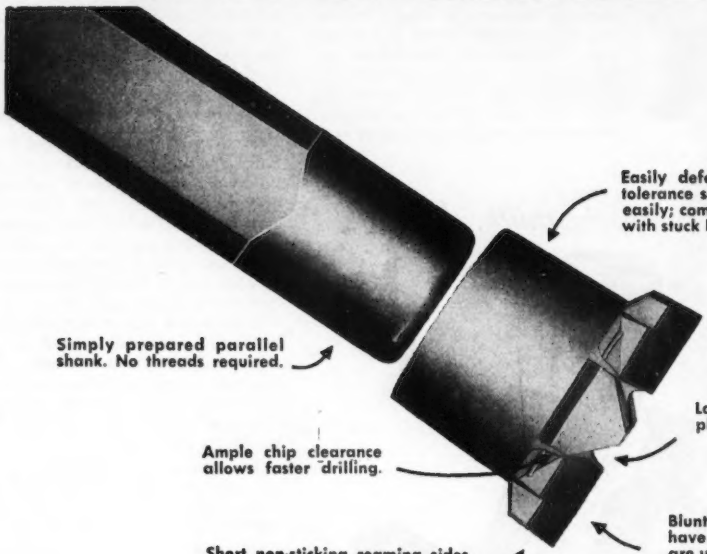
UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

T-1329

UNITED STATES STEEL

THROWAWAY


Easily deformable skirt with close tolerance socket hole . . . bit goes on easily; comes off easily; no lost time with stuck bits.
Simply prepared parallel shank. No threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency—are uniformly hard.
Short non-sticking reaming sides allow close gauge following.

LOWER YOUR DRILLING COSTS

with

SMALLER HOLES AND FASTER DRILLING

Bottom with 1¼" Hole

Save Powder and Steel

WRITE FOR NEW LOW PRICE LIST

THE "TEST" WILL PROVE ITS WORTH

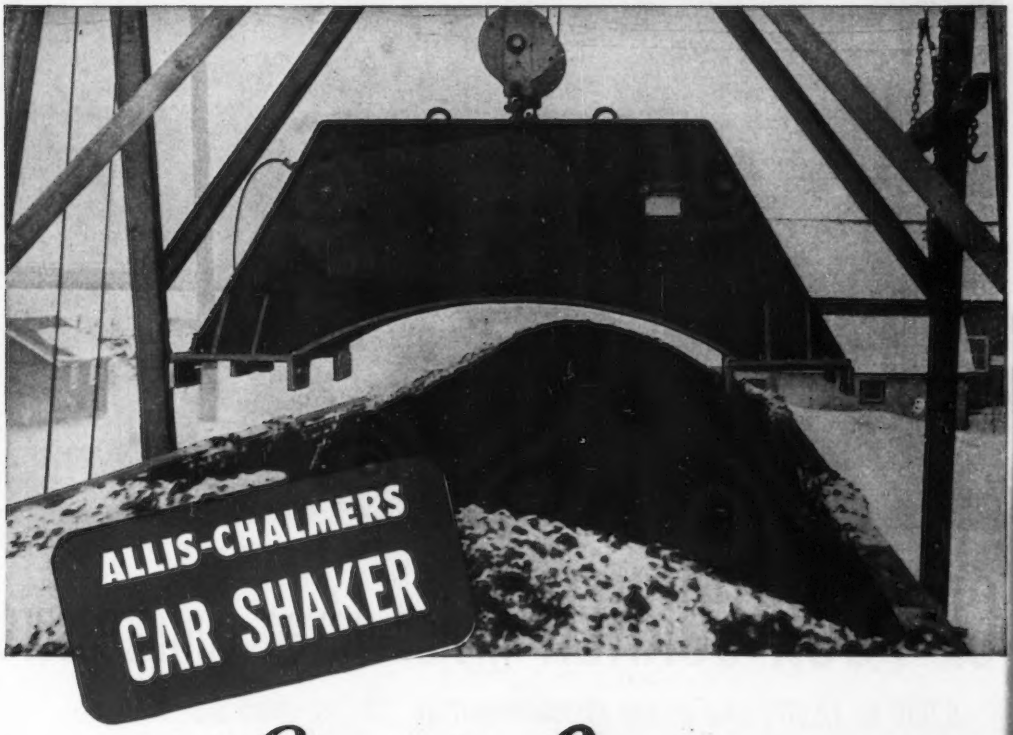
THROWAWAY BIT CORPORATION

4200 N.W. Yeon Ave. **Portland, Oregon, U.S.A.**

Fully descriptive literature on all products is available. Competent field engineers and dealers are always at your service.

Some territories still open for distributors and jobbers.

FAST UNLOADING



...and Sturdy Construction

BESIDES BIG SAVINGS in man-hours and demurrage costs, operators report savings in maintenance and downtime with Allis-Chalmers car shakers. And no wonder! Allis-Chalmers has designed these units for long, dependable service without trouble. For example:

- Shaker body is one-piece, all-welded structure made of 1 in. thick reinforced steel plate and stress-relieved to eliminate welding strains.
- Motor and drive are totally enclosed within shaker body, protected from weather and accidental injury. Motor is mounted in a special cradle base and protected from vibration damage with multiple shear mountings.
- Extra large bearing — 11⅞ in. outside diameter. Long bearing life! Heavy duty shaft arranged for hydraulic bearing removal.

Get more facts about how Allis-Chalmers car shakers can save money in your operations. Call the A-C representative in your area. Allis-Chalmers, Milwaukee 1, Wisconsin.

Car Shakers Promote Safety to Personnel!

ALLIS-CHALMERS

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

Please send my copy of Car Shaker Bulletin 07B7221A.

Name .....

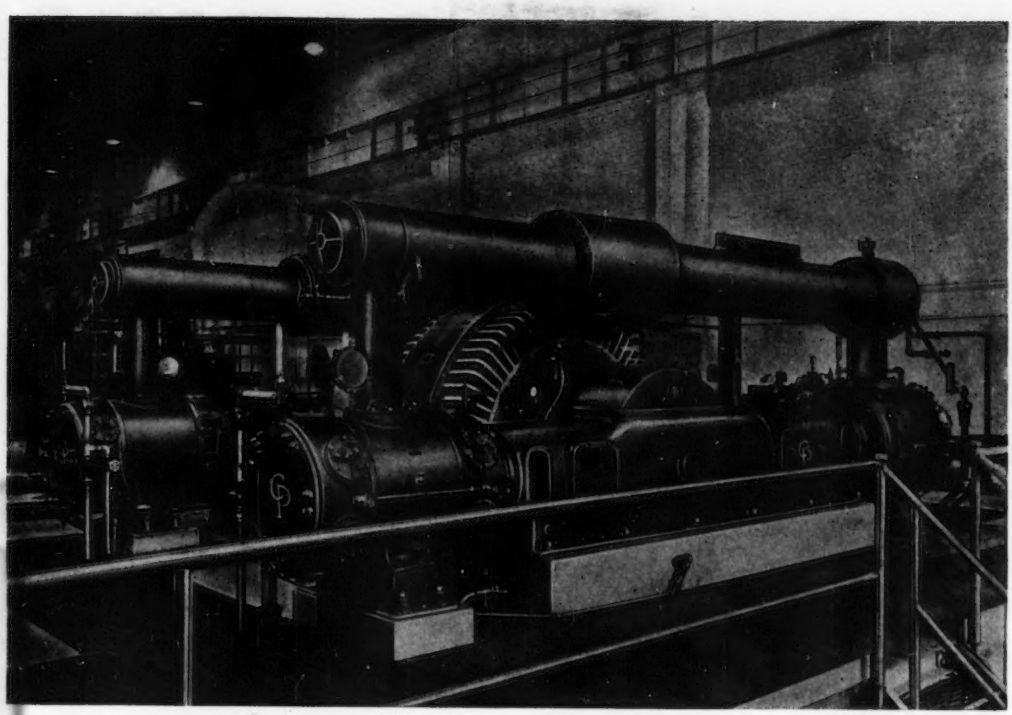
Title .....

Firm .....

Address .....

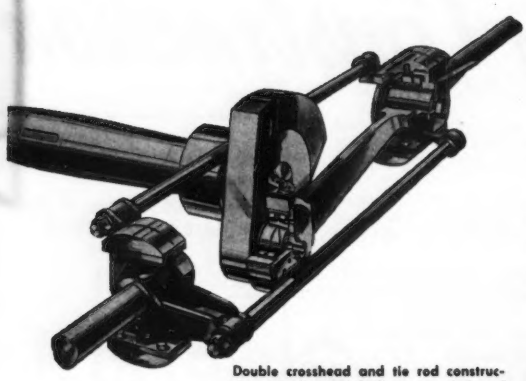
City ..... State .....

A-3466



CP FOUR-CORNER motor-driven compressors

6,000 to 12,000 cfm piston displacement at 100 lbs. pressure



Double crosshead and tie rod construction provides straight-line transmission of power — with only one connecting rod. Roller bearings and crank discs are mounted by the oil injection method.

Class H-CE Duplex Synchronous Motor-Driven Compressors have anti-friction roller bearings throughout: spherical roller main and crankpin bearings . . . heavy-duty needle bearings at crosshead pins.

The use of roller bearings in the running gear, and the oil injection system of bearing installation and removal, eliminate all danger of misadjustment in maintenance, and permits the use of one-piece crank disc and solid-end connecting rods — the strongest and safest type.

Write for Bulletin 726-C

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Get maximum safety and service life at minimum cost

WITH JOY ELECTRICAL CONNECTORS

CONVENIENT • FLEXIBLE • ECONOMICAL

RIGHT ... Tap-off made with Joy Connector. Circuit can be opened or closed at will—speedily, safely, neatly—simply by engaging or disengaging male plug.

WRONG ... Photo taken in lead mine shows how extension was wired into main line and later carelessly cut off, thereby creating a hazardous condition.

OVAL STYLES
Also available with 3 contacts

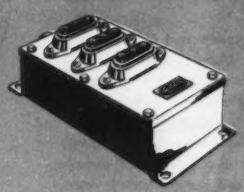
Female Portable

Female Wall Receptacle

Male Machine Receptacle

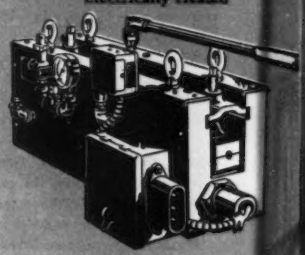
Male Portable

GANGS
#F137 Gang



For power tap-offs from single feeder to a variety of operating equipment. Available in 2, 3, and 4 outlet styles. Input fitting threaded for conduit.

CABLE JACKET VULCANIZERS
Electrically Heated



Electric immersion type heaters generate steam for heating mold. Heat control is fully automatic. Has safety "pop-off" steam valve. Available in five standard sizes.

MOLDS AVAILABLE FOR ALL STANDARD CABLE

Dangerous, makeshift wiring installations can be eliminated with the use of Joy Electrical Connectors. Of one piece molded Neoprene construction, Joy Connectors are watertight and shatter-proof—impervious to adverse climatic or mining conditions. Oils, acids, alkalies or moisture have little effect on their life span or conducting efficiency.

All Joy Connectors are supplied with lengths of cable as specified by the customer. Each Connector is permanently attached to its cable through "taper-neck" vulcanization—a process that provides additional strength at this vital point. When fully engaged, contacts are completely enclosed in a waterproof Neoprene housing.

For an easy and economical solution to your wiring problems try Joy Electrical Connectors. A wide variety of types and styles is available—each designed for maximum safety, economy, and trouble-free service.

An attractive new Joy Bulletin, No. MC-109, available upon request, describes this equipment in detail.

Write for Bulletins, or *Consult a Joy Engineer*

W&D ME 3884

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

USE

"SYMONS" SCREENS

ALL THE WAY...

"SYMONS" VIBRATING BAR GRIZZLIES

from PRIMARY SCALPING on through the FINER SEPARATIONS

For sizing operations, Nordberg offers a broad line of "SYMONS" Vibrating Screens from Heavy Duty Grizzlies for scalping through a wide range of types and sizes to meet practically every problem. Here are the "highlights" of the units illustrated:

"SYMONS" Vibrating Bar Grizzly . . . for scalping coarse materials, designed to assure non-clogging action with big capacity.

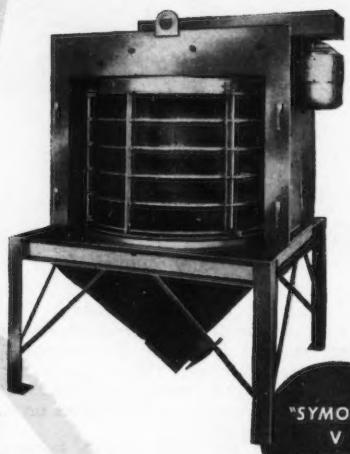
"SYMONS" Rod Deck Screen . . . employs a highly efficient screen deck, utilizing individual replaceable spring steel rods. Features low screening cost—big capacity—low maintenance—long life—ideal for moist and sticky materials.

"SYMONS" Horizontal Screen . . . unsurpassed for accurate sizing of stone, gravel, slag, coal and ores. (Fully enclosed units available for efficient "hot plant" asphalt operations). Built in a variety of deck combinations, permitting a wide range of sizes to be handled.

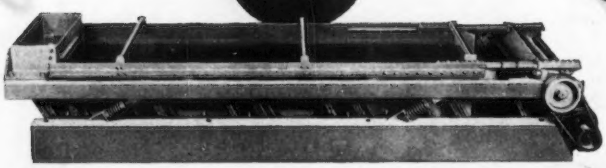
"SYMONS" "V" Screen—the newest addition to the proven and popular line of "SYMONS" Screens—for extremely fine—single cut wet or dry separations. An entirely new principle of screening—employing controlled diffused feed—and vertical flow of material—with low speed rotary and high speed gyratory action.

Write for descriptive literature covering the type of unit in which you are interested.

"SYMONS" ROD DECK SCREENS



"SYMONS" V SCREENS



"SYMONS" HORIZONTAL SCREENS

NORDBERG MFG. CO.
MILWAUKEE 7, WISCONSIN
NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
MEXICO, D. F. • LONDON • TORONTO • JOHANNESBURG

"SYMONS" . . . a Nordberg trademark known throughout the world

S251

NORDBERG

Machinery for processing ores and industrial minerals

"SYMONS" PRIMARY CRUSHERS

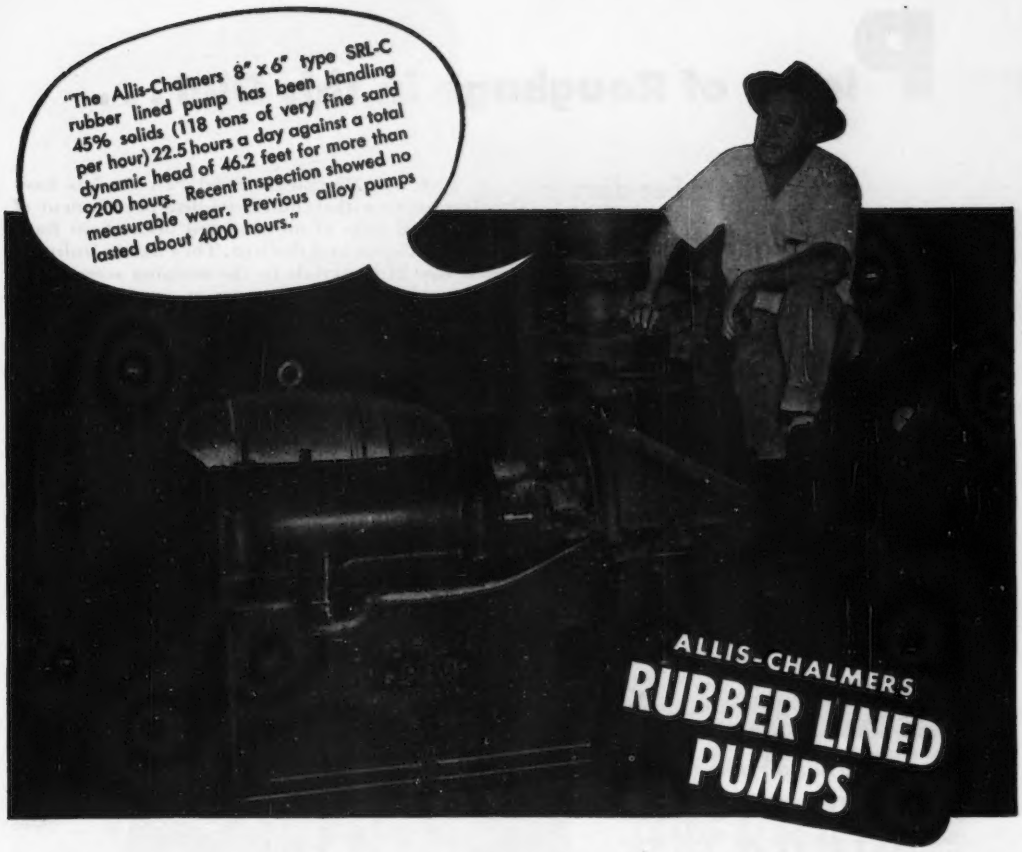
"SYMONS" CONE CRUSHERS

ROTARY KILNS

GRINDING MILLS

MINE HOISTS

DIESEL ENGINES


"The Allis-Chalmers 8" x 6" type SRL-C rubber lined pump has been handling 45% solids (118 tons of very fine sand per hour) 22.5 hours a day against a total dynamic head of 46.2 feet for more than 9200 hours. Recent inspection showed no measurable wear. Previous alloy pumps lasted about 4000 hours."
ALLIS-CHALMERS
RUBBER LINED
PUMPS

9200 HOURS HANDLING SAND

"No Wear"

HANDLING FLORIDA SAND mixed with rutile, ilmenite, zircon and monazite will grind any metal pump to pieces in short order. But this Allis-Chalmers rubber lined pump has been operating for more than a year with no measurable wear. 10 to 50 times the service life of the best metal alloy pumps is not an uncommon record.

Special Compounds Used

Rubber lining compounds are especially engineered for each application. Linings are bonded to steel frames and not to the pump body. Linings may be replaced without removing the pump from its location. The impeller is equally easy to remove and replace.

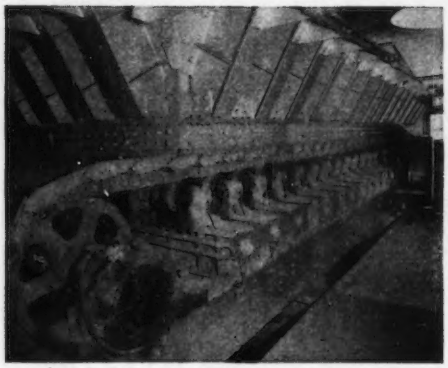
If you are pumping fine mesh, hard, abrasive materials (⅛" to 325 mesh size), you may find that an Allis-Chalmers SRL rubbed lined pump will mean longer life and lower costs per gallon pumped. Ask your nearby Allis-Chalmers District Office representative, or write Allis-Chalmers, Milwaukee 1, Wis. and ask for Bulletin 08B7311.

A-3476

ALLIS-CHALMERS

Plenty of Roughage in this Diet . . .

as S-A Pan Feeders handle ore up to 3000 tons per hour



CRUSHING PLANT

Rail cars dump ore from nearby open pit mines into receiving hoppers. Four AMSCO Manganese Steel Pan Feeders, mounted thirty feet below, have a combined capacity of 3000 tons per hour. Each feeder is 72" wide by 27' long. Ore moves in a measured flow from the dump hoppers to scalping screens and then to the crushing plant.

• **S-A Manganese Steel Pan Feeders have the stamina to withstand the endless punishment of thousands of tons of ore dumped onto them hour after hour, day in and day out. They assure uninterrupted flow of materials to the scalping screens—in uniform volume without under or overloading conveyors.**

AMSCO* manganese steel construction and S-A design combine to produce a unit which is incredibly sturdy—highly resistant to wear and abrasion. That means dependable service for many years *with minimum maintenance and spells low cost per ton operation.*

For fifty years S-A engineering has met and solved the toughest problems in bulk materials handling. Whether you plan to install new equipment, or enlarge your present set-up, you will benefit by the recommendations of S-A engineers. Write us.

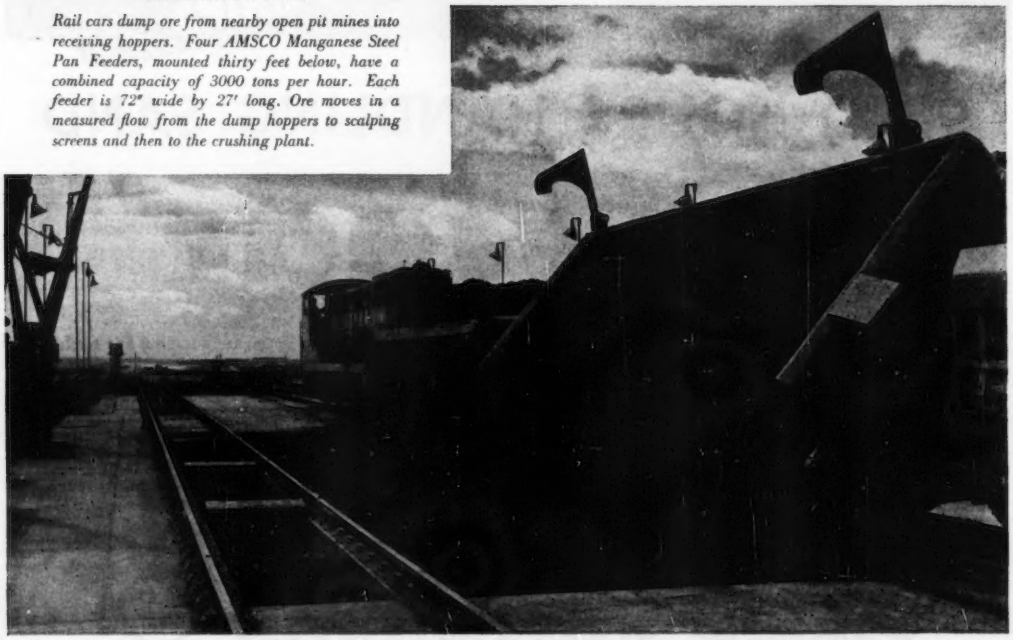
*T. M. Reg. American Brake Shoe Co.

1901-1951

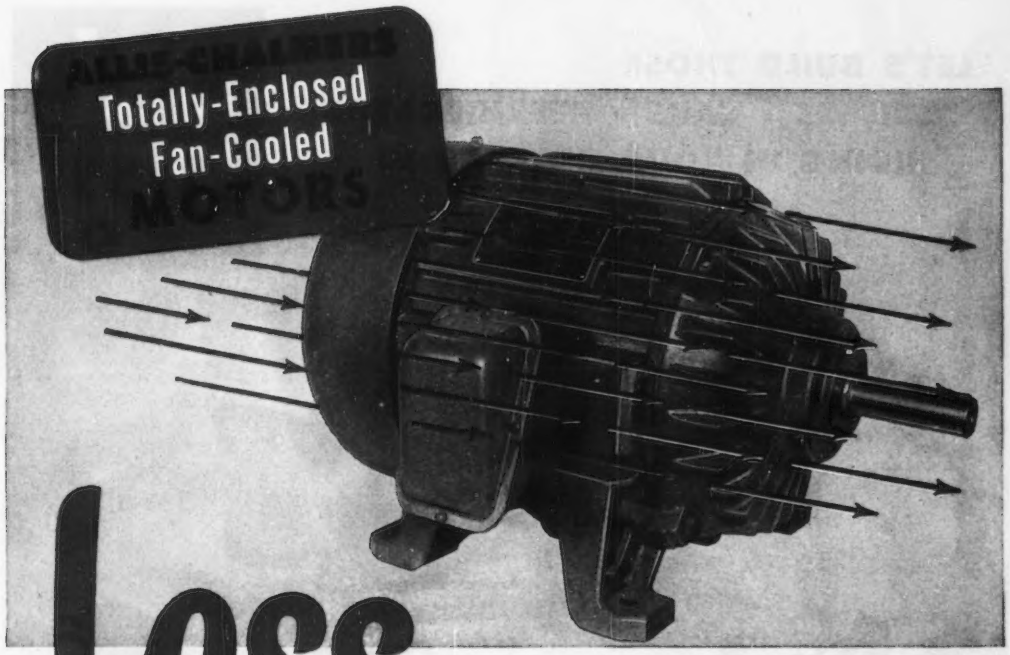
50 years experience with bulk handling

STEPHEN S-A ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois • Los Angeles, Calif. • Belleville, Ontario



DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT



Less MOTOR CLEANING ...INSPECTION...OVERHAUL!

HERE'S A MOTOR that actually blows itself clean! Dirt is carried away by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers tefc motor.

Dirt can't build up to cause overheating. Concealed air passages and pockets have been eliminated. Even oily dirt that sticks can simply be wiped or blown off.

And this means savings! Maintenance costs are traditionally low on totally-enclosed, fan-cooled motors. But they're lower than ever before on the new Allis-Chalmers Type APZ tefc motor.

Rigid Construction

The frame is cast iron which has high resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed, fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Distributor or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

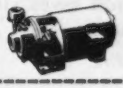
A-3426

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

***TEXROPE* — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.**



PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

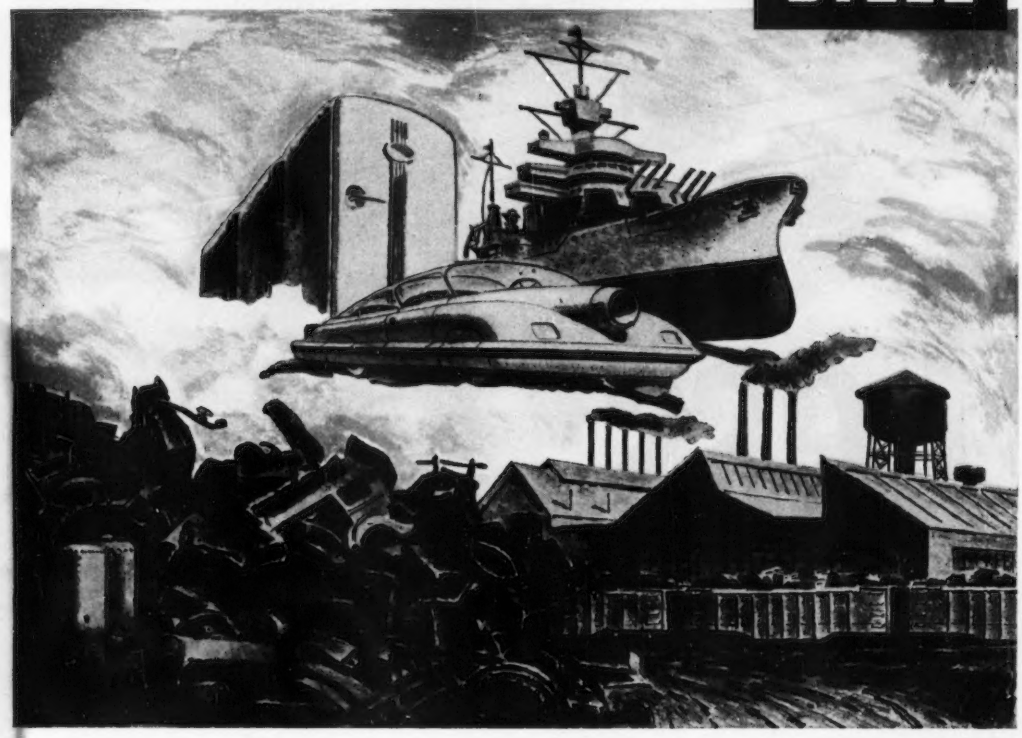
Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.

LET'S BUILD THOSE
CRUISERS • CARS • REFRIGERATORS
HIDING IN YOUR OPERATION!

J&L STEEL



How much scrap is wasting away in your Plant?

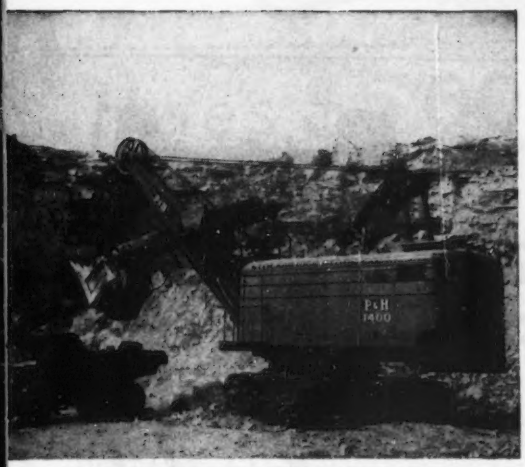
Yes . . . hiding . . . gathering dust . . . rusting away! Whatever your business, you probably have more scrap iron and steel laying around your plant or operation than you imagine. Today, this scrap is one of America's most precious raw materials. It is needed urgently —every single ton saves vital ore. Get *your* scrap in. *Maximum quotas of steel cannot be obtained without it.*

Check NOW. Look for obsolete iron and steel machinery . . . fixtures . . . chains . . . broken parts—any old metal that's just gathering dust. Get it all together, call your scrap dealer. He'll pay you for it and get it back into production. Do it right away.

SCRAP IS YOUR BUSINESS, TOO!

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

down come costs



These two P&H Electrics serve the same steel-making operation at Birmingham, Alabama. The Model 1600, owned by the Birmingham Slag Company, is loading blast furnace slag. The Model 1400, digging fluxing stone, is owned by the Stockbridge Stone Company.

with P&H ELECTRIC SHOVELS

Wherever these new P&H Electrics take over, costs go *down!* It couldn't be otherwise, with all the improvements that make for faster, smoother, more dependable digging.

There's Magnetorque* Hoist Drive, which gives you snappier dipper action with electro-magnetic power — completely eliminates hoist generator, hoist motor, slip friction clutch, and other mechanical devices.

There's P&H stepless power regulation — smoother, more accurate — and no control fingers or contactors to require maintenance or give you trouble.

There's tough, all-welded construction for extra strength without excess weight.

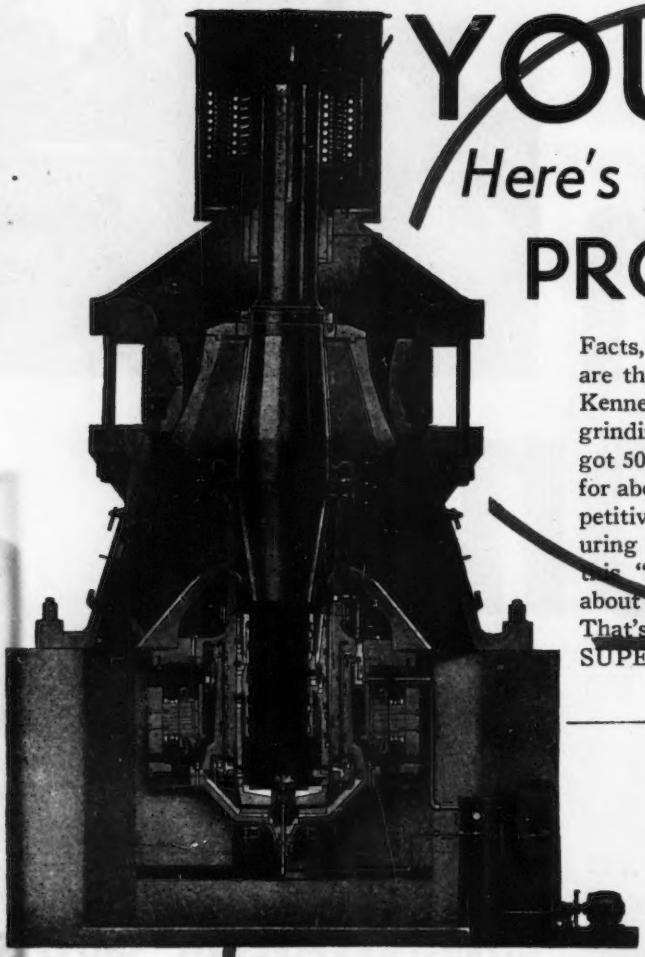
There's more — *much more* — see a P&H before you invest in new equipment of this type.

* Trade-mark of Harnischfeger Corporation for electro-magnetic type clutch.

P&H
ELECTRIC SHOVELS
4454 W. National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

Every third P&H Electric Shovel sold is a repeat order

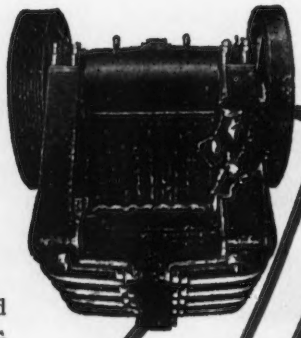
POWER SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FAB HOMES



YOU'RE IN

Here's your PRODUCTION

Facts, not talk, are what you want! Here are the FACT results of a test run on a Kennedy No. 37½ Crusher with a special grinding ring and 3″ feed opening. They got 50% MORE of a finer, better product for about HALF the power cost of a competitive crusher of comparable size. Figuring power cost at 1 cent per h.p. hour, this "KVS" SAVED some 40 h.p. (or about $[illegible] a day) or about $3,000 a year! That's not luck — THAT'S "KVS" SUPERIORITY!



Here's LONGER LIFE

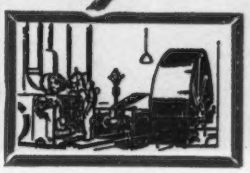
Is it LUCK because there's less wasted power and effort in the "KVS" SWING JAW CRUSHER? No — it's because we redesigned the STATIONARY jaw to carry 50% of the crushing load. You get more production and get it more efficiently. We took LUCK out of MAINTENANCE too. The swing jaw is ALL IN ONE PIECE, except for the crushing plate. That's removable. Note also—Swing and Stationary jaws are INTERCHANGEABLE, and reversible end for end. That DOUBLES jaw-crushing life for you lucky "KVS" users!

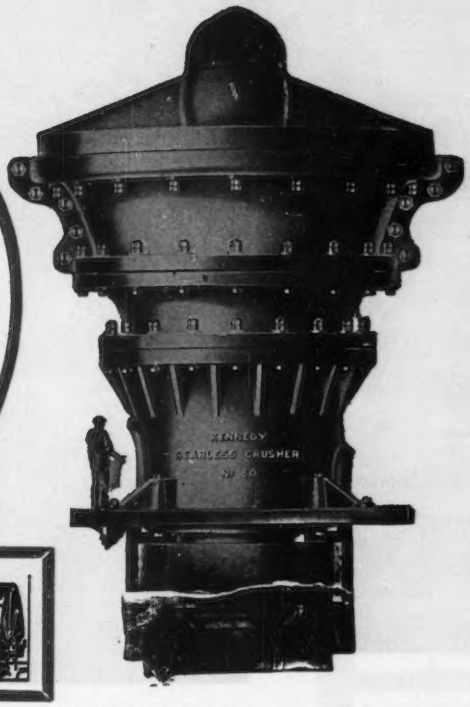
IT'S YOUR LUCKY DAY WHEN

LUCK!!!

Here's your POWER!

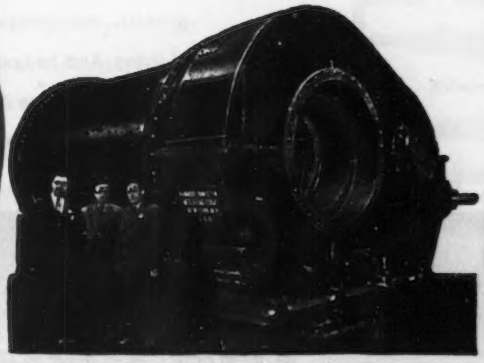
You're out of luck if you haven't enough POWER to run a big CRUSHER. But when you use a "KVS" Gearless you get ADDED FREE POWER for no added cost! That's the extra power that results when a big pulley or fly wheel whirls around—like the big pulley on the old Corliss Engine. There's a BIG Pulley in the "KVS" Gearless! It whirls at 3,500 ft. per minute—and the EXTRA crushing energy or crushing power you get isn't "luck"—it's "KVS" superior design. The 8-ton pulley (used in a "KVS" Crusher weighing 400,000 lbs.) whirls so easy you can turn it with TWO FINGERS! In short, more CRUSHING for LESS POWER COST makes "KVS" lucky for users everywhere.





Here's $5,000 for you!

You'd be lucky if you found $5,000—and could keep it! But don't trust to "luck"—take the SURE way and save that $5,000 on a 10 ft. tube or ball mill. How? Suppose you buy a "KVS" with integral gear drive. The Kennedy INTEGRAL GEAR DRIVE enables motor to be DIRECT CONNECTED to driving shaft. ON A 10 FT. MILL THIS ENABLES YOU TO PURCHASE THE SYNCHRONOUS MOTOR AT A SAVING OF ABOUT $5,000. Shaft is carried in roller bearings that CANNOT be misaligned or set wrong. Pinion shaft to which the motor is connected runs at 600 r.p.m.; other pinion shafts run about 180 r.p.m. "KVS" trunnions on large sized tube and ball mills are CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically sprayed with oil before tube mill is started (Design patented). And they never wear out!



WRITE today for complete set "KVS" Bulletins if you want MORE production with less cost.

Kennedy-Van Saun
MANUFACTURING AND ENGINEERING CORPORATION
2 PARK AVE., NEW YORK 16, N. Y.
FACTORIES:
DANVILLE, PA., U.S.A.
CANADA, ENGLAND, FRANCE, ITALY, AUSTRALIA

YOU BUY "KVS"

• • • • Every steel man knows this picture. He knows that the open hearth has made possible steel's magnificent contribution to America's industrial growth...our amazingly high standard of living. And he knows that steel production stands as our first line of defense in today's troubled world.

The refractory industry has kept pace with steel by producing refractories that last longer . . . stand higher heats . . . are available in adequate quantities. General Refractories is proud of its part in this task of serving steel.

Inside this furnace you may find

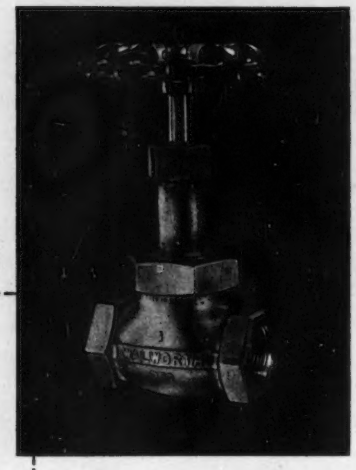
GENERAL REFRACTORIES

RITEX C and RITEX A Basic brick, STEELKLAD brick, General's Silica and Fireclay brick. But throughout the plant you'll find many another General product scientifically designed and produced to do the particular job at hand.

General offers the steel industry exhaustive research facilities, modern production methods, skilled personnel. General's 43 mines, 29 plants, 18 sales offices and more than 200 distributing agencies are strategically located throughout the nation and abroad. In short, General offers you a complete refractories service!

A Complete
Refractories Service

IDENTIFICATION DISC: An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.



take a good look at the Walworth "500 Brinell" no. 225P Globe

NEWLY DESIGNED HANDWHEEL: Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

– the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. 227 P) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.

IMPROVED PACKING: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure when fully opened.

note these 7 Great Features

HEXAGONAL UNION BONNET CONNECTION, DEEP STUFFING BOX AND RUGGED STUFFING NUT: Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

SEATS AND DISCS: Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

EXTRA STRONG BODY: Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test of 1,000 psi.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Condor HOMOFLEX HOSE

"... Everything we want in a hose!" • That's how users sum up the many advantages of Homoflex Hose. • That's why they order more and more Homoflex once they discover it's really a *different* hose . . . easier to coil and uncoil . . . no kinking . . . easier to carry and drag . . . lasts longer in "rough going". • Bulletin 6879D tells why the unique construction of Condor Homoflex makes a better hose for handling air, water, other fluids and gases. • Extra qualities are also engineered into our other hose, V-belts, flat belting and conveyor belts. Just phone your R/M distributor.

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

MAINTENANCE SERVICE
UNIFIED RESPONSIBILITY
APPLICATION ASSISTANCE
RESEARCH, DEVELOPMENT AND TESTING
CO-ORDINATED ENGINEERING DESIGN
DO NOT LUBRICATE
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor

EXTRAS like these assure long-range performance

You get more than a motor and a starter when you install these Life-Lines. You get complete design, engineering and service every step of the way.

CO-ORDINATED ENGINEERING DESIGN makes sure that Life-Line motors and Life-Linestarters give long-range performance. They're made together to work together.

RESEARCH, DEVELOPMENT AND TESTING in Westinghouse laboratories result in such features as:

Steel frame
Pre-lubricated bearings... in Life-Line motors
"De-ion"® arc quenchers
Bimetallic relays . . . in Life-Linestarters®

APPLICATION ASSISTANCE to help you select the right motor and control.

Application engineers for your daily problems
Consulting engineers for special design problems
Field offices in 123 locations for all your service requirements

All at your service without obligation.

UNIFIED RESPONSIBILITY . . . for operation of the motors and protective controls.

One supplier . . . makes your work simpler.

MAINTENANCE SERVICE is all-inclusive and nationwide.

36 fully-equipped repair shops
52 engineering and service offices

Who else can offer all these EXTRAS?

More details? Ask your Westinghouse representative. Call him today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21637

YOU CAN BE SURE... IF IT'S
Westinghouse
Life-Line
MOTORS and CONTROLS

Just before the blast.

The holes begin to fire . . .

and the blast progresses . . .

across the face . . .

without spurts of wasted gas.

A well-shot pile!

Machine Gun Camera Tells the Story

Rockmaster ***at work in Kingston Trap Rock Company Quarry, Kingston, N. J., proves blasting control whether your job is coal mining, stripping, quarrying or construction.***

Twelve holes eighty feet deep were loaded with 9028 pounds of explosives—Apex #4 MV and 75% Giant Gelatin. Spacing was twenty feet; burden eighteen feet. Because it was important to minimize noise and vibration, ROCKMASTER milli-second delay detonators Numbers 1 through 12 were detonated at the bottom of the holes.

The quarry operator reported that even though this was a larger blast than he normally fired, no complaints about noise or vibration were received. And the photos show that breakage was *good!*

Ask your Atlas representative to show you the picture presentation of the ROCKMASTER story. He will show you through the eye of the machine gun camera how *you* can profit by using the correct numbers of the *sixteen* ROCKMASTER milli-second delay detonators teamed with the ROCKMASTER system of explosives choice and loading methods.

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

MORE AMPERES CAN RIDE THESE CABLES

You can do yourself and our country a service by installing Simplex-ANHYDREX XX Cables wherever you need to replace high voltage power cable.

Here's why. You can crowd more amps into the same size copper when it is insulated with Simplex-ANHYDREX XX. That's how you save copper. Of course your cables will run hotter but that's all right with Simplex-ANHYDREX XX insulation. This insulation is built to withstand 75°C. to 80°C. (167°F. to 176°F.), depending on operating conditions.

Simplex-ANHYDREX XX Insulated Cables can be used underground, directly in the earth, or in ducts, or they can be used overhead as aerial cables. The special Simplex neoprene jacket protects these insulated conductors from sunlight, oil, acids, alkalies, etc.

Want to know more about this versatile high temperature, high voltage power cable insulation that really combats moisture and water? Then return the coupon. No obligation, of course.

Simplex-ANHYDREX XX is a product of Simplex Research

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF BOOKLET 1009A TO:
NAME_____ TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____

It costs more to fix piping now!

You do less fixing

by using Dependable Quality

CRANE VALVES

. . . That's why more Crane Valves are used than any other make

better performing diaphragm valves

Separate disc and diaphragm design distinguishes these Crane Valves from all similar packless types. Life of diaphragm is multiplied because it's used only to seal the bonnet—not for seating. The separate disc seats the valve, eliminating wear and tear on the diaphragm.

Increased flow capacity . . . reduced flow resistance . . . tighter seating . . . lower torque and fewer turns to operate . . . are typical added features of Crane Diaphragm Valves. Wherever you use them, you can be sure of outstanding performance.

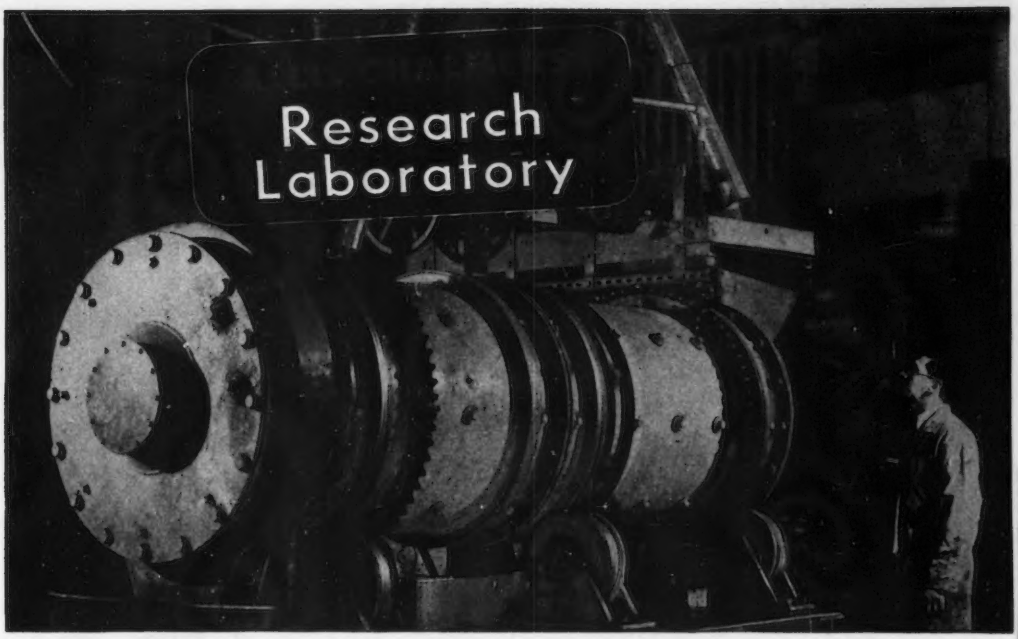
Such better quality and greater dependability mark Crane valves and fittings of every type—and assure the lowest ultimate cost.

No. 1615 Diaphragm Valve Iron Body, Neoprene lined

CRANE

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



How Lab Tests Reduced Initial Plant Cost

A MINING COMPANY wanted to find a low cost method of crushing and dry grinding lead slag to a carefully controlled product of 98% passing 10 mesh. A method had been worked out previously which would meet these size specifications but which required a considerable amount of costly auxiliary equipment. The customer hoped that a simpler method might be found.

A 20-ton sample was sent to the Allis-Chalmers Research Laboratories for a pilot plant test run. Proper operating conditions were established, and it was proved that the required reduction could be achieved by open circuit dry grinding in an end peripheral discharge rod mill with no auxiliary equipment.

As a result of the Laboratory tests, this company was able to save money on the original plant investment. Simplified plant layout also resulted in low maintenance.

CAN YOU USE THESE FACILITIES?

The Allis-Chalmers Processing Laboratory was established to help you work out profitable solutions to processing problems. It contains modern equipment for batch and pilot mill tests in grinding, crushing, sizing, concentrating, pyro-processing, chemical and physical analysis.

The Laboratory's purpose is to develop new or more efficient processing methods...to determine the economics of a process prior to full-scale operation . . . to provide engineering information to guide in designing efficient plants . . . for virtually any type of industry.

Facilities of the Laboratory are available to anyone in industry. Charges are based on costs. Estimates for test work can be obtained from A-C district offices or from Allis-Chalmers Processing Laboratory, Milwaukee 1, Wisconsin.

Send For Your Copy Today

Laboratory Bulletin 07B6419B

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

Name _____

Company _____

Position _____

Address _____

City _____ State _____ A-3444

ALLIS-CHALMERS

Processing Research Laboratory — Dedicated to a Better Utilization of our Raw Materials

RIGHT-ANGLE
ROLLER ENDS, precisely square to avoid end-rub, oscillation and side-shock.

RIGHT-ANGLE
BEARING SURFACES with parallelism that results in unwavering rightline rolling.

RIGHT-ANGLE
SEPARATOR SLOTS accurately machined to prevent roller skew, slide and uneven wear.

Made *RIGHT*...

...that's why they *ROLL RIGHT!*

... Yes, that's the Rollway Bearing quality story compressed into a sentence. For a roller bearing that's held to right-angle trueness of roller ends, bearing surfaces and separator slots doesn't skew. And it's also free from oscillating action that results in dragging end-rub and destructive side-shock. It balances its own internal forces . . . promotes true orbital rotation of rollers within the races . . . reduces vibration and fatigue.

ROLL the RIGHT Way with ROLLWAY

Let's examine your bearing problems together to determine exactly the kind of bearings you need. Our years of specialized bearing experience, plus complete engineering and metallurgical services, are always at your command. No cost. No obligation. Just write or wire Rollway Bearing Co., Inc., Syracuse, N. Y.

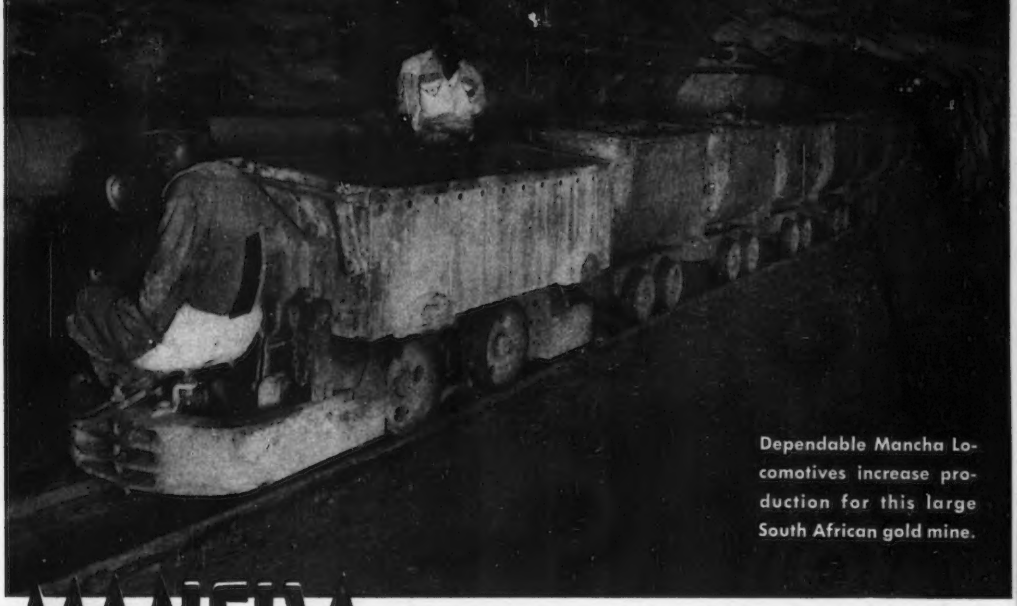
ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

SALES OFFICES

SYRACUSE
PHILADELPHIA
BOSTON
PITTSBURGH
CLEVELAND
DETROIT
CHICAGO
HOUSTON
LOS ANGELES

For a job that's *ROUGH* pick a locomotive that's *TOUGH*



Dependable Mancha Locomotives increase production for this large South African gold mine.

MANCHA storage battery locomotives

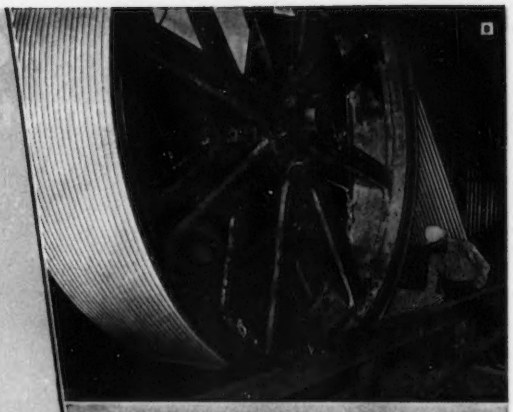
— MOVE MUCK BETTER
— AT LOWER COST
— WITH LESS LOST TIME

There's a Mancha Storage Battery Locomotive designed and engineered to meet YOUR haulage requirements. Write for information *today*.

MANCHA STORAGE BATTERY LOCOMOTIVE
Division **GOODMAN** *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.

Representatives in principal mining areas throughout the world

Prove for yourself why Gates Vulco Ropes are giving you longer V-Belt Wear!



Gates Vulco Ropes very competently handle the drive on this immense Jaw Crusher, said to be the largest ever built. It supplies most of the coarse rock for rip rap—and for secondary crushing—on the Detroit Dam project, Detroit, Oregon.

There is a very simple reason why Gates Vulco Ropes—the V-belts built with *concave sides*—are giving you substantially *longer wear*—and you can easily prove this for yourself in just 2 minutes' time!

Pick up *any* V-belt whatever and bend it as it bends when going around a pulley. As the V-belt bends, grip its sides with your fingers—and here is what will happen, every time.

If the belt you are bending is a *straight-sided* V-belt, you can *feel* its sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-pulley—as shown in figure 1-A (see accompanying diagrams).

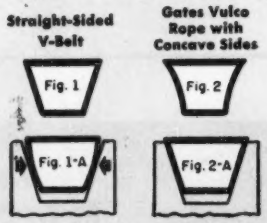
Clearly, this *uneven pressure* against the V-pulley causes the belt to wear *unevenly*—with the wear *concentrated* where the bulge is greatest—and this concentrated wear at one point naturally shortens the life of a *straight-sided* V-belt.

Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt costs for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5110

Gates — Hose · V-Belts · Molded Rubber Goods for Industry

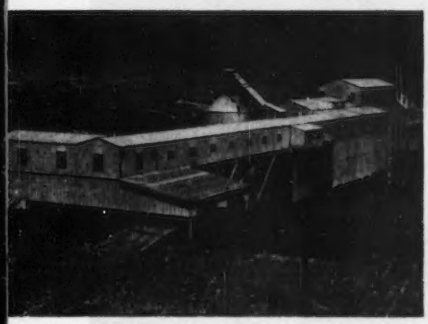
VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A

World's Largest Maker of V-Belts

Columbia-Southern Chemical's Midvale Mine finds that . . .



Modern tipple at Midvale Mine, where belt reinforced with "Cordura" rayon moves 3000 tons a day up a 136-foot lift. The belt, 576 feet between centers, is driven 350 feet a minute through hydraulic drive.

New and stronger belting (*below*) reinforced with "Cordura" rayon soon will replace 1000 feet of conventional belting in the mother belt at Midvale Mine.

Belt reinforced with "Cordura" rayon trains well under high operating tension

Despite heavy operating tension, this 30-inch slope belt at Columbia-Southern Chemical's Midvale Mine, Midvale, Ohio, trains perfectly—whether loaded or empty. It was manufactured by The Goodyear Tire and Rubber Company on a 4-ply fabric carcass made of Du Pont Cordura* High Tenacity Rayon.

Belting reinforced with "Cordura" rayon has been used since 1948 at Midvale Mine. Engineers there like its easy troughing, high strength and minimum stretch. Recently they ordered 1000 feet more for the mother belt.

Why do belts reinforced with "Cordura" rayon train better? Because "Cordura" rayon yarn is so much stronger than natural fiber yarns it permits a thinner belt with fewer plies. These thin belts are more flexible and sit firmly on the center idler whether loaded or empty, so they train better. And their low stretch saves costly shutdowns for take-up and resplicing.

Before you order your next conveyor belt, ask about the use of "Cordura" rayon in belts. We'll be glad to send you the names of suppliers of these belts . . . also give you full information about this Du Pont fiber in a new booklet "Sinews for Industry." For your free copy, address: Rayon Division, Room 4421, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.

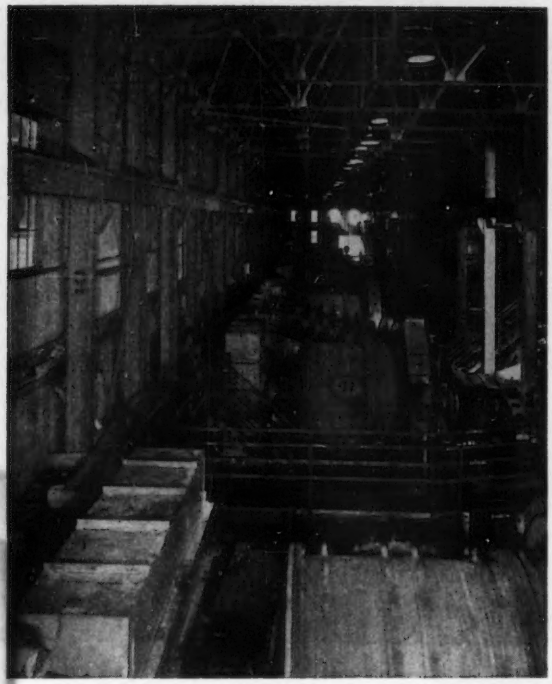
Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



MARCY'S PROVED PERFORMANCE FOR 22 YEARS RESULTS IN 10TH REPEAT ORDER FROM CLIMAX

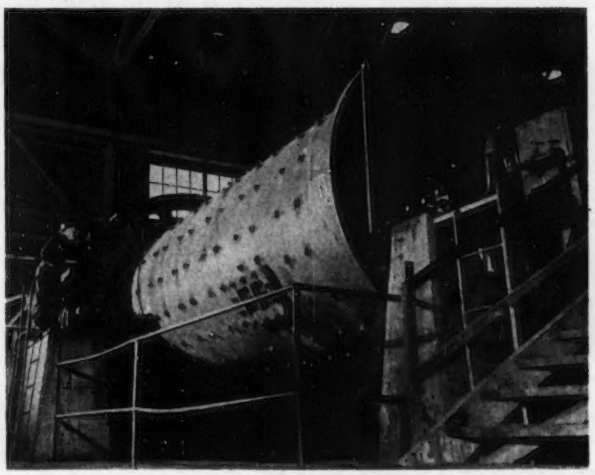
3—No. 99 Marcys Ordered to Meet Urgent Need for Moly.

In 1929 Climax Molybdenum installed its first Marcy Mill, a No. 97. Based upon its performance additional Marcy's were ordered and Climax now has a total of 17...2—5x20, 4—8x20 pebble mills, 1—No. 97 and 9—No. 99 ball mills. Grinding at Climax is done exclusively with Marcys.

Conversion to Grate Discharge Increased Output 17%.

Some of the No. 99 mills were ordered as regular overflow mills. During the war they were converted to grate discharge. Although this shortened the mills 10½" it increased output 17%; with no appreciable change in power, ball and liner costs per ton.

This is but one of the many installations where Marcy Grate Discharge Mills have proved their lower cost per ton performance. Write or call our grinding specialists for information.



Other MASSCO products: Massco-Fahrenwald Flotation Machines, Genuine Wilfley Tables, Massco-McCarthy Hot Millers, Rock Bit Griaders, Density Controllers, Belt Feeders, Rubber Pinch Valves, Assay and Laboratory Supplies and Equipment, Complete Milling Plants.

The Mine & Smelter Supply Co.

Box 5270, Terminal Annex, Denver, Colo., U.S.A.

Offices in Salt Lake City, El Paso, 1775 Broadway, N. Y. C.

Canadian Vickers, Ltd., Montreal, Can.; W. R. Judson, Santiago, Chile; The Edward J. Nell Co., Manila, P.I.; The Austral Otis Eng. Co., Ltd., So. Melbourne, Austr.; Margards-hammars Mek. Verkstads Aktiebolag, Margardshammar, Sweden; The Ore & Chemical Corp., 80 Broad St., New York 4, N. Y., representatives for Continental Europe.

For improved drilling costs

AND

higher man-shift production

. . . use Le Roi-CLEVELAND Air-feed Sinker Drills

THE free world needs a lot of copper, iron, nickel — whatever you mine. So don't let manpower problems curtail your production. Give your miners a helping hand. Equip them with Le Roi-CLEVELAND Air-feed Sinker Drills—and watch the increase in tonnages per man-shift, the improvement in drilling costs.

Here's why miners get more done with Le Roi-CLEVELAND Air-feed Sinker Drills

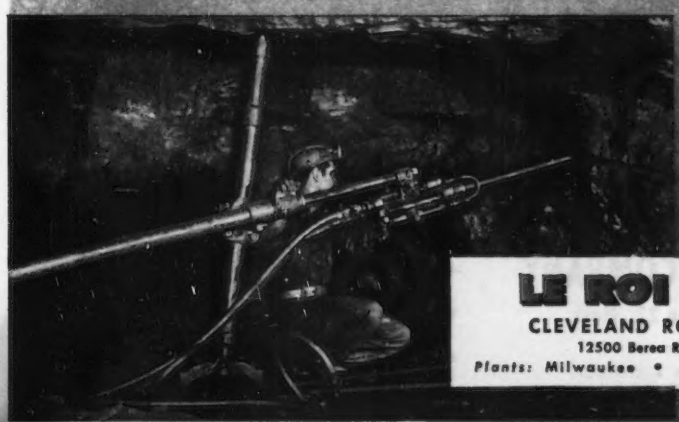
Setups are faster — our Air-feed Sinkers are much lighter and easier to handle than a drifter drill. When a miner uses one of them with our lightweight Model 83 air column, he can set up in just a few minutes.

Changing steels is quick and easy — the quick reverse feed saves time and all controls are handy. Moreover, a miner doesn't have to loosen or tighten swing or dump nuts.

Drilling speeds are high — the fast, light blows of Le Roi-CLEVELAND Air-feed Sinker Drills are just right for carbide bits. You get maximum bit life — this lets you use smaller bits for higher drilling speeds.

Note — in addition to more footage per shift and more tonnage per man you get these extras: extremely low air consumption — and maintenance costs that are 50% less than those of a drifter.

Le Roi-CLEVELAND Air-feed Sinker Drills are available in two sizes — the HC10R using the popular 45-lb. H10 drill and the HC23R with the 3⅛-inch bore H23 machine. Write today for complete information.



LE ROI

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

Plants: Milwaukee • Cleveland • Greenwich, Ohio

Sturtevant Dry Batch

Mixers

Give You Every Advantage for Quick, Thorough, Economical Mixing

• Hand Lever controls receiving and discharging
• Single opening receiving and discharging hopper
• Hand Wheel operates rack and pinion slide gate
• Heavy, massive mixing drum
• Swing chute for receiving and discharging
• Mixing scoops assure thorough mixes
• Man size opening for easy cleaning

The Sturtevant Dry-Batch Mixer is an efficient rotating drum-type machine for mixing various substances together into a homogeneous and inseparable whole, every part of which presents the same analysis. The substances may be of different weights and physical properties, and may be either dry, partly dry, or a mixture of both.

Because of the unique design of its mixing chamber, and the 4-way mixing action which brings two or more substances together, the Sturtevant Dry-Batch Mixer does a more rapid mixing job than other machines and, at the same time, it is complete and thorough in every particular.

Write for bulletin today.

Compare These Advantages

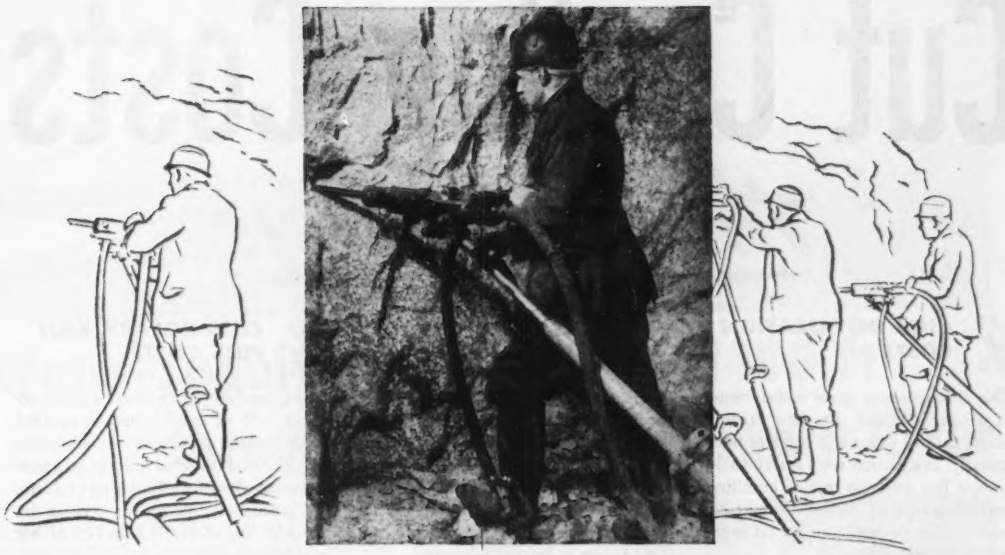
- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production...assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough, cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 5 models . . . a size for every mixing job . . . smallest size mixes up to 7½ tons per hour . . . largest size up to 75 tons per hour.

STURTEVANT MILL COMPANY

101 Clayton Street, Boston 22, Mass.

Designers and Manufacturers of:

CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
ELEVATORS • MIXERS
MECHANICAL DENS and EXCAVATORS



The approach to Dry Rock Drilling

—DUST FREE

The Holman Dryductor Drill traps all dust at source and removes it from the face

After six years of concentrated experimental efforts — work began on May 1st, 1945—Holman Bros. Ltd. are able to announce a dry-drilling dustless rock drill — the DRYDUCTOR. This is the culmination of 71 years of progress in rock drill design and is a new development in the prevention of dust diseases in mines, collieries, tunnels, quarries, wherever rock is drilled. The DRYDUCTOR extracts the *dry* dust as it is made, passes it through the rock drill and draws it away from the face by pipeline. The system works with any method of conserving or disposing of dust.

The DRYDUCTOR is in the highest tradition of Holman design and Holman precision engineering and is destined to set a new standard in rock drilling technique.

As shown, the DRYDUCTOR is mounted on an Airleg, but it may be hand-held or used on any form of mounting. It will drill at any angle.

Further particulars available on request.

World patents pending.

HOLMAN BROS. LTD. CAMBORNE ENGLAND 1801 - 1951

Cut Cooling Costs

these 3 Ways

1. CUTS INSTALLATION COSTS

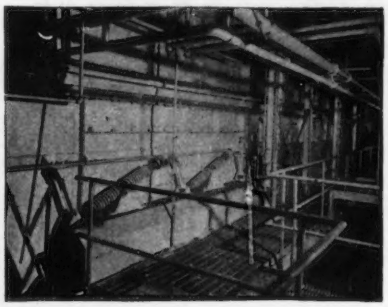
The air-quenching grate cooler comes as a complete unit, fits into existing plants readily because it operates horizontally. Installation costs are 10 to 30 percent less than the cost of installing any other type of cooler! Kiln piers need not be elevated . . . no pit is required beneath kiln.

2. CUTS MAINTENANCE COSTS

Reciprocating motion of grate is carried on flexible rubber bushings and springs. No wearing parts and no slippage. Material does not slide on grate, it hops, gently and steadily. Lubrication is negligible, only four grease fittings on entire cooler. Maintenance cost runs as low as 1/10 cent per barrel.

3. CUTS ROTARY KILN FUEL COSTS

Air-Quenching grate cooler actually returns 75% of sensible heat in material back to kiln as secondary combustion air. Material is cooled quickly, to a temperature where handling is no problem, by means of cooling air coming up through the relatively thin bed of hot material on grate.



4½ by 70 ft Allis-Chalmers air-quenching grate cooler installed in processing plant where it cools large quantities of material from 2500° F to approximately 150° F.

Handles Fine or Coarse Materials

Both fine and coarse materials can be cooled equally well. Need for a supplementary conveyor under cooler is eliminated. Pan conveyor can be added on cooler without need for an additional drive. Get more facts from the Allis-Chalmers representative in your area, or write for Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.

Pulverator is an Allis-Chalmers trademark.

ALLIS-CHALMERS

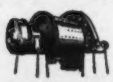
A-3470

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators

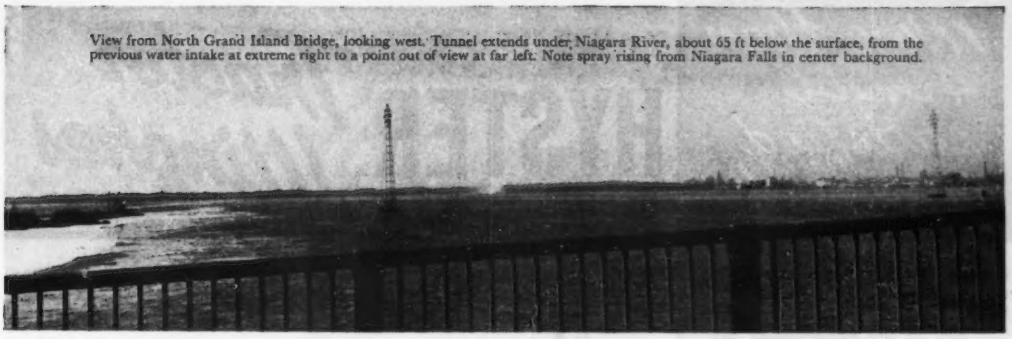
Vibrating Screens

Jaw Crushers


Grinding Mills

Gyratory Crushers

Kilns, Coolers, Dryers



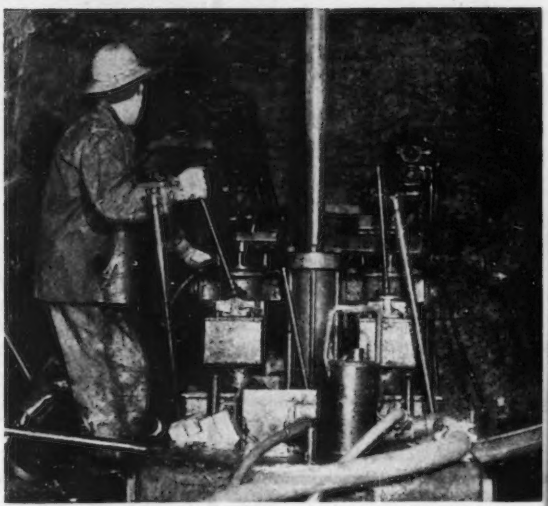
View from North Grand Island Bridge, looking west. Tunnel extends under Niagara River, about 65 ft below the surface, from the previous water intake at extreme right to a point out of view at far left. Note spray rising from Niagara Falls in center background.

Water-Supply Tunnel driven 3400 ft through rock under Niagara River

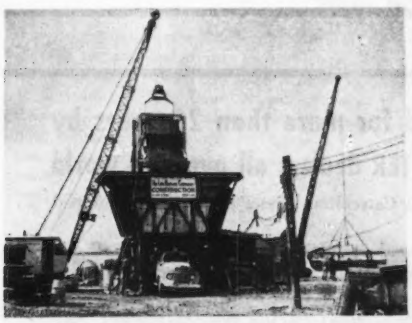
A brand new water-supply system for the City of Niagara Falls is expected to be in operation by August, 1952. To cost nearly $8 million, this job includes a modern pumping system, a new filtration plant and other improvements. A horseshoe-shaped intake tunnel, of 6½-ft finished diameter driven 3400 ft under the Niagara River, completes an interesting phase of the project which will double the water supply for this growing metropolitan area.

From a shaft 65 ft deep near the tip of Grand Island, the tunnel was driven both north and south; the northern end connects with the previous water intake, while the other end extends into the southern channel of the Niagara River at the International Boundary.

As the tunnel headings were advanced, rock was encountered all the way, most of it a variety of dolomite. Working three shifts a day, the daily advance averaged about 27 ft. The excavating of 6500 cu yd of rock required the drilling of about 105,000 lineal feet of blast holes. Bethlehem Hollow Drill Steel, fitted with detachable bits, was used exclusively on the $756,727 tunnel contract.



A modern drill-mounting at the tunnel face speeds the boring of blast holes 8 ft deep. Bethlehem Hollow Drill Steel was used exclusively in this 3400-ft tunnel driven through solid rock all the way.



Crane at the top of the shaft pulls up skip and dumps muck into hopper. Boat at right was used to ferry men out to caissons. Leo Butler Co., Inc., of Silver Spring, Md., is the tunnel contractor; George Naylor, tunnel superintendent; designing engineers, Greeley & Hansen, Chicago, Illinois.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM HOLLOW DRILL STEEL

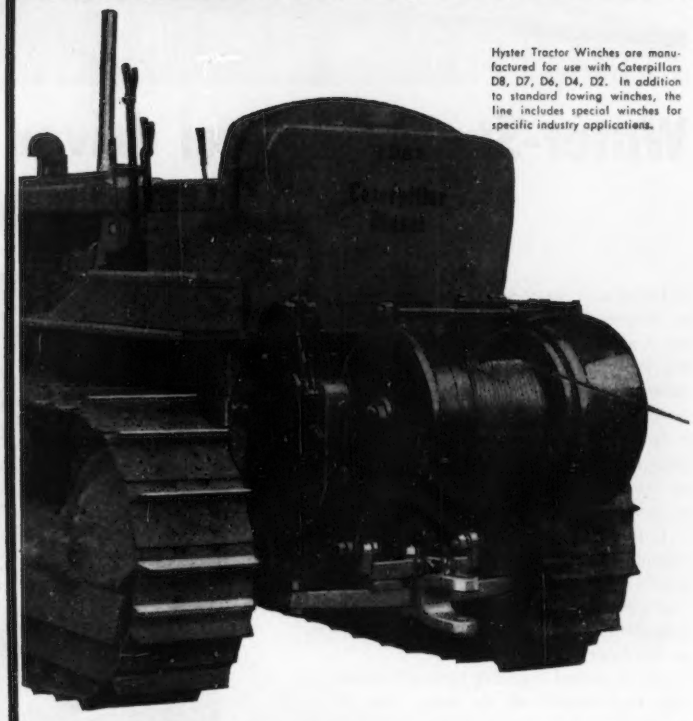
More than 40,000 satisfied owners of

HYSTER® *Tractor Winches*

Hyster Towing Winches increase tractor drawbar pull by as much as 63% when utilizing the maximum line pull of the winch. They are used to —

- ✓ **MOVE** heavy equipment.
- ✓ **RESCUE** heavy trucks or pieces of equipment that are mud-bogged.
- ✓ **PULL** the tractor itself out of mud or other situations that have incapacitated the tractor.
- ✓ **INSURE** against work stoppage or down-time on any project using equipment.
- ✓ **ASSIST** in stump and land clearing operations.
- ✓ **INCREASE** production in logging operations through the use of arch-logging methods.
- ✓ **GROUND SKID** or pan skid logs.
- ✓ **YARD** logs.
- ✓ **PERFORM** innumerable lifting jobs in conjunction with crane attachments.

Hyster's complete line of tractor tools includes winches, yarders, donkeys, cranes, logging arches and sulkies®; Grid Rollers for bituminous road salvage; and Hystaway®, the 5 in 1 tool that includes dragline, clamshell, crane, shovel and backhoe.



Hyster Tractor Winches are manufactured for use with Caterpillars D8, D7, D6, D4, D2. In addition to standard towing winches, the line includes special winches for specific industry applications.

HYSTER

HYSTER COMPANY

2965 N. E. Clackamas, Portland 8, Oregon
1865 North Adams Street, Peoria 1, Illinois

World's Largest Manufacturer of Tractor Winches

Sold and Serviced for more than 20 years by CATERPILLAR-HYSTER dealers all over the world

A high percentage of all Caterpillar Diesel tractors are equipped with Hyster winches.

Caterpillar dealers around the globe—more than 400—sell and service Hyster towing winches for Caterpillar-built tractors.

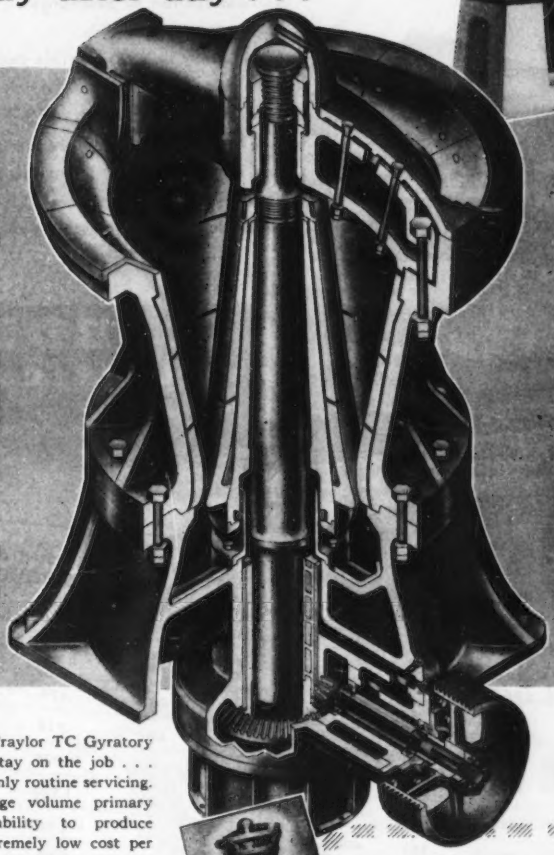
Hyster towing winches are used in these basic work classifications: CONSTRUCTION, INDUSTRIAL, LOGGING, MINING, OIL and GAS, MILITARY, AGRICULTURE, TRANSPORTATION, GOVERNMENT.

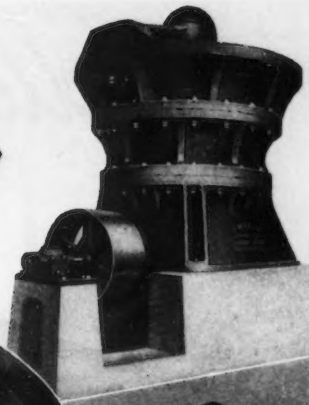
Any Caterpillar dealer will gladly tell you about Hyster tractor winches.

there are 6 reasons why a

Traylor TC Gyratory

can produce huge tonnages day after day . . .





1 Straight line bar type cast steel spider has an extra heavy hub. Absolutely non-weaving. Simple but strong.

2 Main shaft, forged of low carbon high grade steel, is of minimum length but of maximum diameter for greater strength.

3 The patented Traylor dust seal is positive protection against dust and grit getting into the lubrication chamber.

4 Traylor's original self-tightening bell head and curved concaves practically eliminate choking and packing . . . save power waste by applying power as a direct crushing force.

5 A positive, automatic pump-type lubrication system has a water cooled oil reservoir.

6 Self contained counter shaft bearing fitted with roller bearings . . . is automatically lubricated as is the machine cut steel gearing used in the Traylor T.C.

The rugged design of a Traylor TC Gyratory gives it the stamina to stay on the job . . . *day after day* . . . with only routine servicing. It accounts for this large volume primary crusher's outstanding ability to produce huge tonnages at an extremely low cost per ton. If you need more production . . . or lower costs . . . you need a Traylor TC Gyratory. Send for free literature that gives full details.

Mail Coupon For Full Information

TRAYLOR ENGINEERING & MANUFACTURING CO.
484-B Mill St., Allentown, Pa.

I want to know all about a Traylor TC Gyratory

Name _____

Company _____

Address _____

SALES OFFICES: New York, N.Y.; Chicago, Ill.; Los Angeles, Calif.
CANADIAN MFRS: Canadian Vickers, Ltd., Montreal, P.Q.

Traylor

Rotary Kilns, Coolers and Dryers • Grinding Mills
Jaw, Reduction and Gyratory Crushers • Crushing Rolls
Apron, Grizzly, Slurry and Table Feeders.

A "TRAYLOR" LEADS TO GREATER PROFITS

Yardley PLASTIC PIPE for water or waste disposal systems

Whatever the need . . . for cold water or corrosive liquids, suction or discharge . . . there's a Yardley Plastic Pipe for the job.
Made from rigid or flexible light-weight material. Acid and alkali resistant. Won't rot, rust or corrode. Produced in a full range of pipe and tubing sizes, ½" through 6". Complete line of standard fittings and adapters. Easier to install, more economical to handle.
Send for chemical resistance charts.

M-6 with cement-type sleeve coupling.

M-2 flexible type.

M-6-T/C with male adapter and threaded coupling added.

M-1 with insert adapter attached

YARDLEY
PLASTICS CO.
142 Parsons Ave. · ADams 9315
Columbus 15, Ohio

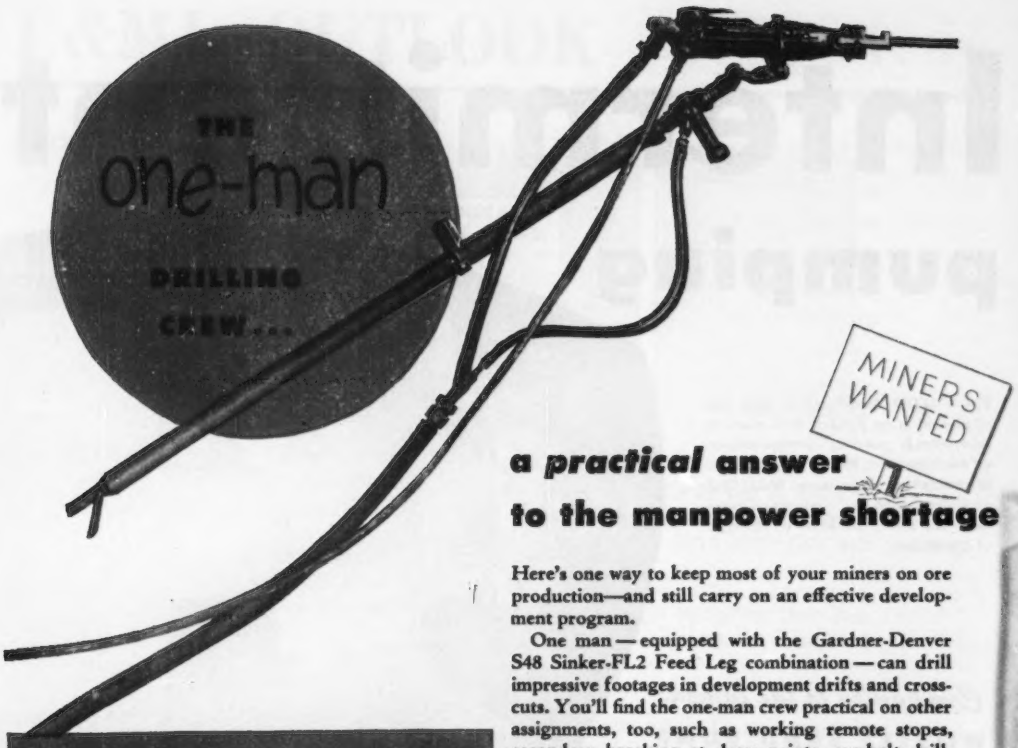
YARDLEY M-1 and M-2 FLEXIBLE PIPE SPECIFICATIONS

PIPE SIZE	NOMINAL O. D.	NOMINAL I. D.	CALCULATED B. P. P. S. I.	APPROXIMATE WT. PER FT.	NORMAL SHIPPING LENGTHS
½"	.820	.620	540#	.092	400' Coils
¾"	1.080	.840	350#	.141	400' Coils
1"	1.340	1.100	200#	.179	300' Coils
1¼"	1.640	1.360	200#	.263	300' Coils
1½"	1.900	1.610	200#	.357	250' Coils
2"	2.375	2.067	170#	.434	200' Coils
3"	3.500	3.068	165#	.899	100' Coils
4"	4.500	4.026	150#	1.220	25' Straight
6"	6.675	6.065	115#	2.400	25' Straight

YARDLEY M-6 AND M-6-T/C RIGID PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
½"	.053	.476	.600	700
¾"	.080	.715	.855	625
1"	.138	.970	1.140	550
1¼"	.20	1.230	1.420	525
1½"	.32	1.510	1.730	490
2"	.45	2.00	2.250	400
3"	.555	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-6 and M-6-T/C recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°. For M-1 and M-2 working pressures, use 60% of calculated burst.



a *practical* answer to the manpower shortage

Here's one way to keep most of your miners on ore production—and still carry on an effective development program.

One man — equipped with the Gardner-Denver S48 Sinker-FL2 Feed Leg combination — can drill impressive footages in development drifts and crosscuts. You'll find the one-man crew practical on other assignments, too, such as working remote stopes, secondary breaking at draw points, eye-bolt drilling, etc.

This lightweight Gardner-Denver combination is specially designed for fast drilling with tungsten-carbide tipped rods and detachable bits. It consists of the new 45-pound S48 Sinker—the equal of most 55-pound drills in speed and power—mounted on the lightweight, long-travel FL2 Air Feed Leg.

Write us today for complete information.

for more footage per man-hour
...always choose
GARDNER-DENVER
SINKERS

Heavy-duty shaft-sinking models also available.

℞ from the drill doctor

Drills lubricated by the L012 Automatic Line Oiler *can't* run dry—never show symptoms of inadequate lubrication.

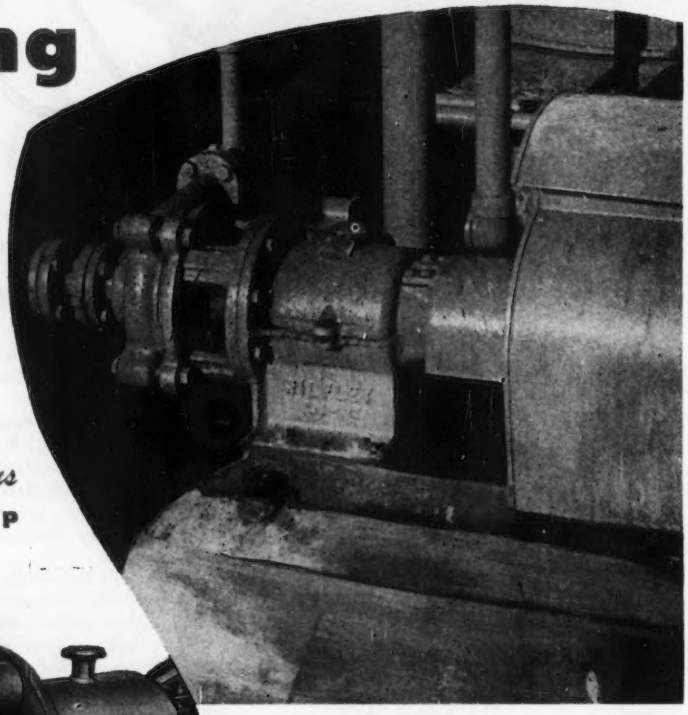
SINCE 1859

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada:
Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Intermittent pumping



The WILFLEY Acid Pump at right, one of several in an Eastern acid plant, is intermittently pumping chlorine-saturated sulphuric acid, 90-93% concentration, at atmosphere temperature. WILFLEY'S exclusive design and construction make this pump a real cost-saver on this type of application.

Companion to the famous
WILFLEY SAND PUMP

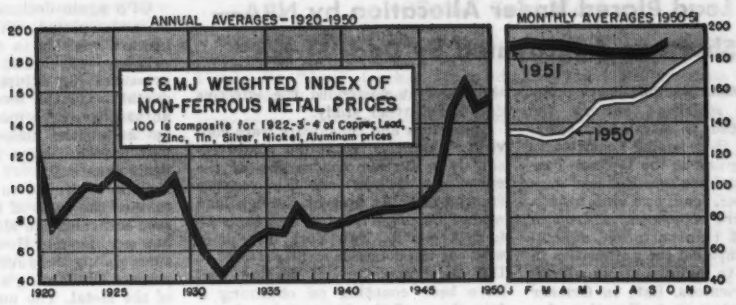
Absolute dependability under the pressure of 24-hour-a-day service has established WILFLEY Acid Pump as the leader in its field. This pump definitely increases production and saves costs in handling corrosives, hot liquids, mild abrasives and other solutions. 10- to 2,000-G.P.M. capacities; 15- to 150-ft. heads and higher. Wetted parts of practically all machinable alloys. Plastic lined models available. Individual engineering on every application. Write or wire for complete details.

A. R. WILFLEY & SONS, INC., DENVER, COLO., U.S.A.
New York Office: 1775 Broadway, New York City

WILFLEY *Acid* PUMPS

E&MJ OUTLOOK

PRICES



•

MARKETS

When the OPS raised the price of lead and zinc 2¢ per lb. early in October, it meant a rise in the *E&MJ* index of nonferrous metal prices for October to 193.21, up 7.06 points. The high mark for the year to date was set in February at 194.06. Tin was responsible.

The OPS flatly denies even considering any rise in the copper price, but we've heard that before. The copper market will be tighter than ever well into 1952, partly owing to delayed imports blocked by the New York dockers' strike.

•

LABOR

If mobilization went all out, metal mining would be up against it for manpower. Even under present partial mobilization, 5,000 more men must be found annually, and that seems impossible, as it is.

Mine Mill's leaders, cocky over their recent show of strength, aim to settle remaining contracts, then go after bigger pension plans.

•

AT HOME

Peace in Korea, if it comes, would slacken only slightly the tide of military spending. Barring wholesale cancellations, military contracts would then level off at a rate of about $55-billion annually by next spring. There'll be no drop in demand for metals.

Anaconda is negotiating with the AEC to build a mill to treat uranium ore mined by the Santa Fe Railway near Grant's, N.M. The ACM has also given aluminum production a lot of study lately.

Montana is in the news with a new tungsten find (see Highlights), and an intra-Government tangle over Harvey Machine Co.'s planned aluminum plant there. The whole aluminum program is in for a shake-up.

Keep your eye on the new chrome-carbide alloy developed by Carboloy. It's hard as tungsten carbide, but contains no tungsten or cobalt.

Charles E. Stott, director of the former ECA Strategic Materials Division, will have the whole non-communist world to work in with his new set-up in DMPA. He has at least $55-million to use as a starter.

•

ABROAD

Lake Shore's decision to forfeit its Canadian Government gold subsidy and sell all its gold on the free market presages a downturn in gold prices. Free markets are, in fact, already softening (see Markets).

Decision of the NPA to allocate imported lead, which is already under ceiling prices (see Markets), is part of the U.S. Government's attempt to cut imported raw material costs. All it will do in lead, however, is cut imports even farther than they have been.

MARKETS—Trends and Prices

Foreign Lead Placed Under Allocation by NPA—Copper Shortage Aggravated by Dock Strike

THOUGH GENERAL MATERIALS are showing a more stabilized pattern, the supply situation in metals and alloying elements is becoming consistently tighter, according to the Defense Production Administration. Reduced supplies of copper, lead, and zinc, resulting from work stoppages, a drop in imports, and transportation difficulties, have compelled the authorities in Washington to tighten up on allocations to fabricators. Late in October it became evident that allocations for November would be cut by at least 10%.

Our price index for major nonferrous metals rose 7.06 points in October to 193.21. The 2¢ per lb. rise in lead and zinc sanctioned by OPS as the month opened caused the jump. Weakness in foreign silver was a minor factor. The high for the year was 194.06 last February when tin sold at record levels.

The Federal Reserve Board's index of industrial activity moved up from 217% of the 1935-39 average in August to 219% in September. The rate of activity for October is expected to show little change from that of September. The rise has been less than expected.

A strike of dock workers at ports on the Atlantic seaboard, in its 18th day as October ended, tied up approximately 20,000 tons of copper, making a bad supply situation even worse. A strike closed down the Herculaneum smelter of St. Joseph Lead on Oct. 18. Production of this smelter amounts to about 5,000 tons of lead a month.

Lead Order Shocks Trade

Among outstanding developments was an amendment to lead order M-76, announced Oct. 29, which placed imported pig lead under the same allocation as soft domestic lead, effective Nov. 1. Though some such move was not unexpected, the timing was generally held to be all wrong. The pricing situation on foreign metal remains most involved because of higher quotations prevailing abroad and the import duty of 1 1/16¢ per lb.

Congress adjourned without suspending the duty for the period of the emergency, which was contrary to all expectatons. The drive to suspend the duty will be continued after Congress reconvenes Jan. 8, 1952.

The order as originally issued was held to be unworkable and an undue hardship to importers under contract to obtain lead. Soon after NPA became aware of the havoc raised by the order it postponed the effective date for further study.

Importers and consumers were convinced that the regulation would result in a further contraction of the movement of lead into this country from abroad. At present, foreign lead cannot be imported for less than 23 to 23½¢ per lb., New York, duty paid, whereas the domestic ceiling stands at 19¢. Most importers of foreign lead have been counting on obtaining a fair share of the 19¢ metal to bring down their costs.

There was some speculation on whether reduced purchases of foreign lead by United States' buyers might tend to weaken the price structure outside of this country.

In the Jan.-Aug. period of 1951 our imports of pig lead averaged 14,871 tons a month. This contrasts rather sharply with the 36,811 tons imported monthly during all of 1950.

Out to Drop Foreign Prices

The Office of Price Stabilization, in Supplementary Regulation 71 on pricing of foreign lead and zinc, said:

"The wide discrepancy between domestic and world prices has a serious adverse effect upon the stabilization program and the defense effort. . .

"At the direction of the Director of Defense Mobilization, an overall program with respect to zinc and lead has been developed to correct the conditions which now exist. . . It is believed that the adjustment in the ceiling prices for zinc and lead of foreign origin granted by this supplementary regulation will operate to restore the basis upon which such materials were normally sold, while the limitation upon the prices which consumers may pay for zinc and lead obtained outside of the United States will alleviate to some extent the upward pressure upon world prices."

Copper Most Critical

DPA classified copper as being in "almost dangerously short" supply. Two large strikes, an extreme shortage in scrap, and continued low imports have made copper the most critical of all metals for both the immediate and the long-range outlook, DPA officials hold.

Production of refined copper in the United States, as expected, declined from 79,613 tons in August to 74,104 tons in September. During the first half of 1951, output of refined copper in this country averaged more than 100,000 tons a month, statistics show.

OPS again declared that no action is contemplated with respect to an upward revision in ceiling prices for primary copper and scrap. However, pressures for adjusting the domestic quotation to the level now obtaining abroad have been increasing and market authorities believe that the price will have to move up to the 27½¢ basis eventually.

Chile continued to market its 20% take on the basis of $1,200 per metric ton, equivalent to slightly more than 54¢ per pound. However, conditions surrounding the purchase of such copper are eliminating all outside buying of the metal. The metal is not available for resale and guarantees must be furnished "at the government level" that restrictions will be observed.

Zinc apparently is in better supply than either copper or lead. But this is due largely to the tight situation in other key products in which zinc is of secondary importance, as copper in brass and sheet steel in galvanizing. A reduced rate of activity in the automobile industry has been offset by expanding defense business, so that

Average Prices for October (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	24.200
Electrolytic, Export, Refinery.	27.425
Lead:	
Common, New York	19.000
Common, St. Louis	18.800
Silver and Sterling Exchange:	
Silver, New York, per oz.	88.147
Silver, London, pence per oz.	77.130
Sterling Exchange, "Checks"	279.943
Zinc:	
Prime Western, East St. Louis	19.500
Tin:	
New York Straits	103.000
New York, 99% min. (e)	102.000
Gold, per oz. U.S. price	**$35.000**
Quicksilver, per flask	**216.962**
Antimony (E&MJ) (d)	**45.350**
Antimony, bulk, Laredo	**42.000**
Antimony, in cases, Laredo	**42.500**
Platinum, refined, per oz.	**$90.000**
Cadmium (a)	**255.000**
Cadmium (b)	**267.500**
Cadmium (c)	**280.000**
Aluminum, 99% plus, ingot	**19.000**
Magnesium, ingot	**24.500**
Nickel (f)	**56.500**

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.
(a) Cadmium average based on the producers' quotation.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.

die casters remain quite active. Congress took no action on the suspension of the zinc duty.

With no market in either lead or zinc on Oct. 1, owing to advance notice of the price rise of 2¢ per pound, the E&MJ averages for October in both metals reflected the new ceiling basis only. In other words, there were no sales at a flat price in these metals on Oct. 1.

Manganese ore was unsettled largely because of growing reluctance on the part of large consumers as well as the Government to meet the views of sellers in the free market.

"Free" Gold Market

Reflecting the recent change in policy by the International Monetary Fund, the "free" market for gold was lower in all trading centers, according to *Pick's World Currency Report*. Operators were concerned over increased offerings from Canada. Quotations per fine oz.:

	Coins		Bars (12.5 kg.)	
	Sept. 28	Oct. 30	Sept. 28	Oct. 30
New York, transit	.....	.....	$40.38	$39.25
Manila	$49.50	$48.00	42.25	39.50
Hong Kong	49.50	47.50	43.50	41.50
Bombay	58.00	58.00	49.75	49.25
Tangier	54.50	53.50	40.38	38.75
Beyrouth	50.00	50.00	40.63	39.00
Paris	58.50	55.50	43.50	41.75
Buenos Aires	53.50	56.00	45.00	43.00

(Markets continued on page 107)

Major Metals
U. S. DAILY AND AVERAGE PRICES

Oct. 1951	Electrolytic Copper (a) Domestic	Electrolytic Copper (b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	24.200	27.425	103.000	No Market	No Market	No Market
2	24.200	27.425	103.000	19.000	18.800	19.500
3	24.200	27.425	103.000	19.000	18.800	19.500
4	24.200	27.425	103.000	19.000	18.800	19.500
5	24.200	27.425	103.000	19.000	18.800	19.500
6	No Market	27.425	103.000	19.000	18.800	19.500
8	24.200	27.425	103.000	19.000	18.800	19.500
9	24.200	27.425	103.000	19.000	18.800	19.500
10	24.200	27.425	103.000	19.000	18.800	19.500
11	24.200	27.425	103.000	19.000	18.800	19.500
12	Holiday	27.425	Holiday	Holiday	Holiday	Holiday
13	No Market	27.425	103.000	19.000	18.800	19.500
15	24.200	27.425	103.000	19.000	18.800	19.500
16	24.200	27.425	103.000	19.000	18.800	19.500
17	24.200	27.425	103.000	19.000	18.800	19.500
18	24.200	27.425	103.000	19.000	18.800	19.500
19	24.200	27.425	103.000	19.000	18.800	19.500
20	No Market	27.425	103.000	19.000	18.800	19.500
22	24.200	27.425	103.000	19.000	18.800	19.500
23	24.200	27.425	103.000	19.000	18.800	19.500
24	24.200	27.425	103.000	19.000	18.800	19.500
25	24.200	27.425	103.000	19.000	18.800	19.500
26	24.200	27.425	103.000	19.000	18.800	19.500
27	No Market	27.425	103.000	19.000	18.800	19.500
29	24.200	27.425	103.000	19.000	18.800	19.500
30	24.200	27.425	103.000	19.000	18.800	19.500
31	24.200	27.425	103.000	19.000	18.800	19.500
AVERAGES FOR MONTH						
Oct.	24.200	27.425	103.000	19.000	18.800	19.500
AVERAGES FOR WEEK						
Oct.						
3	24.200	27.425	103.000	17.800	17.600	18.300
10	24.200	27.425	103.000	19.000	18.800	19.500
17	24.200	27.425	103.000	19.000	18.800	19.500
24	24.200	27.425	103.000	19.000	18.800	19.500
31	24.200	27.425	103.000	19.000	18.800	19.500
CALENDAR WEEK AVERAGES						
Oct.						
6	24.200	27.425	103.000	19.000	18.800	19.500
13	24.200	27.425	103.000	19.000	18.800	19.500
20	24.200	27.425	103.000	19.000	18.800	19.500
27	24.200	27.425	103.000	19.000	18.800	19.500

Silver, Gold and Sterling
DAILY AND AVERAGE PRICES

Oct. 1951	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
1	279.9375	90.160	78.500d.	248s.	$35.00
2	279.9375	90.160	78.500d.	248s.	35.00
3	279.9375	90.160	78.500d.	248s.	35.00
4	279.9375	84.750	78.500d.	248s.	35.00
5	279.9375	88.000	74.000d.	248s.	35.00
6	(e)	(e)	(e)	(e)	35.00
8	279.9375	88.000	77.000d.	248s.	35.00
9	279.9375	88.000	77.000d.	248s.	35.00
10	279.9375	88.000	77.000d.	248s.	35.00
11	279.7500	88.000	77.000d.	248s.	35.00
12	Holiday	Holiday	77.000d.	248s.	Holiday
13	(e)	(e)	(e)	(e)	35.00
15	279.7500	88.000	77.000d.	248s.	35.00
16	279.7500	88.000	77.000d.	248s.	35.00
17	279.7500	88.000	77.000d.	248s.	35.00
18	280.0000	88.000	77.000d	248s.	35.00
19	280.0000	88.000	77.000d.	248s.	35.00
20	(e)	(e)	(e)	(e)	35.00
22	280.0000	88.000	77.000d.	248s.	35.00
23	280.1250	88.000	77.000d.	248s.	35.00
24	280.1250	88.000	77.000d.	248s.	35.00
25	280.0000	88.000	17.000d.	248s.	35.00
26	280.0000	88.000	77.000d.	248s.	35.00
27	(e)	(e)	(e)	(e)	35.00
29	280.0000	88.000	77.000d.	248s.	35.00
30	280.0000	88.000	77.000d.	248s.	35.00
31	280.0000	88.000	77.000d.	248s.	35.00
AVERAGES FOR MONTH					
Oct.	279.943	88.147	77.130d.	—	35.00
AVERAGES FOR WEEK					
Oct.					
3	279.9375	90.160	—	—	—
10	279.9375	87.350	—	—	—
17	279.7500	88.000	—	—	—
24	280.0500	88.000	—	—	—
31	280.0000	88.000	—	—	—

Calendar week averages, New York Silver: Oct. 6th, 88.646; 13th, 88.000; 20th, 88.000; 27th, 88.000.
(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

E&MJ HIGHLIGHTS

Exploration in Montana snowballed into a tungsten rush.

- **At low-grade deposits near Dillon, Mont.,** about 14 separate groups are exploring ore widths up to 150 ft. where several million indicated tons could be open-pitted. Some participants believe it may be the largest deposit yet found in the United States.
- **Frank Eichelberger and associates** started exploration in World War II, dropped it at war's end. The Brown's Lake deposit, which they are now drilling, appears to be 1,000-ft. long, 50-ft. thick, averaging 0.5% WO_3.
- **Minerals Engineering Co.** is drilling and trenching the Sugar Loaf deposit which extends intermittently for 5,000 ft.; one 45-ft.-thick orebody averages 0.35%. MECO also has the Greenstone deposit, 1,300-ft. long, 45-ft. thick, averaging 0.4%.

There's good news in this issue on cobalt, copper, nickel.

- **How to make a mine:** Invent a new metallurgical process, improve a known geophysical tool, and exert a strong will to succeed. Sherritt Gordon, page 72.
- **In the prophetic study of zinc on page 79,** William Shea sounds an alarm on the growing shortage of zinc, and points to a way of relieving it.
- **When he speaks of using beer to float cuttings from a drill hole,** don't accuse Richie of having a tie-in with Burgerweiser or Schlatz. Get *The Real Facts About Those Famous Old Hand-Drilling Contests,* page 84.
- **For an authoritative report on one of the** world's greatest nonferrous metal operations, Union Minière du Haut Katanga, read Edgar Sengier's article on page 86.
- **Primary crushing of ore underground, and pumping of flotation concentrate for 7½ mi,** are only two of the features of INCO's new Creighton shaft and concentrator, page 96.

Highlights in the news:

- **Mining Congress convention in Los Angeles** drew over 2,000. The consensus honored Congressman Thomas Martin (Iowa), denounced mediator Ching, demonstrated productive ability, and bewailed the labor situation. Speaker Lewis Douglas predicted years of struggle and sacrifice.
- **By discovering vast reserves in Tennessee** and buying Tri-State's Nellie B, American Zinc greatly improved its sources of zinc concentrate. Page 104.
- **In a $5-million program** resulting from agreement with DMPA, National Lead will produce cobalt, nickel and copper from iron concentrates at Fredericktown, Mo. Reduction will be by Chemical Construction Corp.'s new leaching process.
- **Glidden Co. will drill** its zinc deposit in Shasta County, Calif. If drilling confirms 225,000 estimated tons, the company will prepare for underground production.
- **International Minerals & Chemical Corp.** authorized acquisition of the outstanding stock of Hoover and Mason Phosphate Co.
- **"Manpower . . . shortages are likely to continue** in the [metal-mining] industry because of the limited labor supply in mining communities and because of sex and age restrictions on mining employment." Bureau of Labor Statistics.
- **For a $24,560,000 copper concentrator** at its coming Yerington, Nev. pit, Anaconda got DPA permission for quick write-off of 75% of the cost.

ENGINEERING AND MINING JOURNAL
NOVEMBER, 1951

Planners Should Welcome Gold

IT STRIKES US as curiously illogical that the proponents of managed currency should resent either free-market transactions in gold or exercise of the public's natural and proper right to exchange currency for gold at the statutory rate. This attitude is comparable to sailing in hurricane waters, but insisting on throwing the barometer overboard.

It is evident that all over the world political leaders and their economic advisers are determined to proceed with deficit spending rather than tell their respective publics that benefits to be had must be earned. How far they can go in this direction, nobody can accurately foretell. But considering the snowballing quality of fear and the impossibility of building enough jails to accommodate all the people who may sin by becoming fearful, it seems to us that a reliable barometer ought to be welcomed rather than resented. The most dependable indicator of approaching storms would be either the prices of free-market gold or the rate at which the public would be converting paper to gold if they were not denied their right to do so. Knowing that a fiscal storm is approaching, important steps could be taken to avoid or weather it. By insisting on sailing without barometers, currency managers merely run the serious risk of getting caught in a hurricane of fear. This is apart from the sober ethical question of the right of a so-called people's government to deny the public an escape from "funny money."

The desire to heave the barometer overboard has been evident in several places. It is apparent in our law forbidding the conversion of paper to gold. It has been shown in the attempts of the International Monetary Fund to prevent free-market transactions in gold and in the bad grace with which this impossible and unnatural aim was recently given up. It is evident in the world-wide measures to determine foreign exchange rates by force rather than to accept the verdicts of the market places. Apparently the advocates of these various ways of preventing the public from exercising its judgment do not perceive that they are merely half-hearted adherents to a philosophy which only the Communists have been frank enough to pursue fully. The Communists simply shoot the citizens who dare to judge the value of currency.

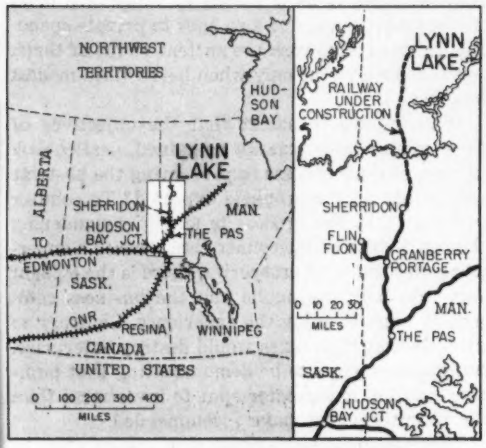
One might think that our politicians and economists, instead of being outstripped only by the Communists in their advocacy of forced values, would have a particular reason for wanting a reliable barometer. They have developed the intriguing concept that they now can assure continued economic growth and prevent depressions by credit control and perpetual deficit spending. They no longer fear the continuous depreciation of dollar values which inevitably results. In fact they welcome it as a means of unloading debt, public and private, and as a spur to private spending. In this framework the ancient virtue of thrift has become a virtue only when held within modest bounds!

Who are we to assert that the objectives of these manipulators cannot be gained, particularly in view of their success in preventing the postwar slump that all the prophets expected? To counter our fear that the process is simply squandering the real wealth of the country underneath a superficial appearance of prosperity, there is the evident fact that both the public and the business community seem to enjoy the experience. Contrary to protests that high taxes would destroy enterprise, businessmen seem to be demonstrating that punitive taxation is a greater spur to investment than the incentives they have recommended.

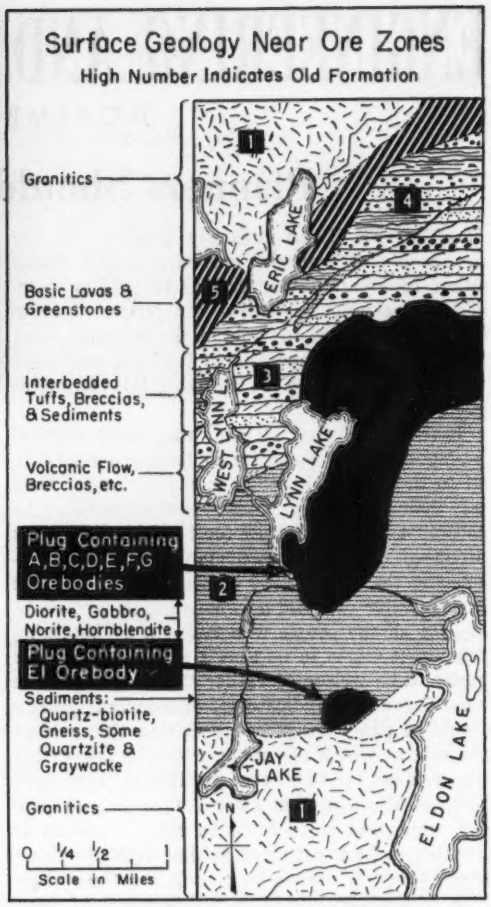
There seems to be no theoretical reason why the economy cannot be regulated and stimulated by the inflation needle indefinitely, as long as the power is held under reasonable restraint. Certain elements in the populace are continuously defrauded by the process, but it is possible that these drags are balanced or exceeded by the energizing of other elements.

The most disturbing fact about this bright new economic world of no more depressions is not the recollections that the use of such power with restraint has never been accomplished. The making of new records is commonplace. It is the intolerance of the planners toward any restraints on their freedom of action, their insistence on sailing into typhoon waters without a barometer. Were they willing to consult a barometer, they might discover some benefits in permitting a fringe of the more fearful passengers the consolation of hoarding gold. If the urge to acquire gold should build up to an alarming extent, it would denote a situation which wise men would undertake to correct rather than impound.

UNDER ELDON L. BROWN, president . . .



at Lynn Lake in northeast Manitoba . . .



in igneous plugs in the pre-Cambrian . . .

Sherritt Gordon Develops

HOWARD L. WALDRON, Associate Editor

THE CLOSING OF A depleted mine is usually an unhappy occasion. But the group of miners at Sherridon, Manitoba, watched without a trace of sadness, as the last skip-load of ore came out of their worked-out mine.

The mine belonged to Sherritt Gordon Mines, Ltd., and that last skip was hoisted on September 16, 1951. The shutdown saddened no one because it marked not the wind-up of an enterprise, but the start of a new one.

In fact, Sherritt's new venture at Lynn Lake, Manitoba, has caught the fancy of a wide group within the industry—geologists, miners, metallurgists, and financiers alike. Here's why:

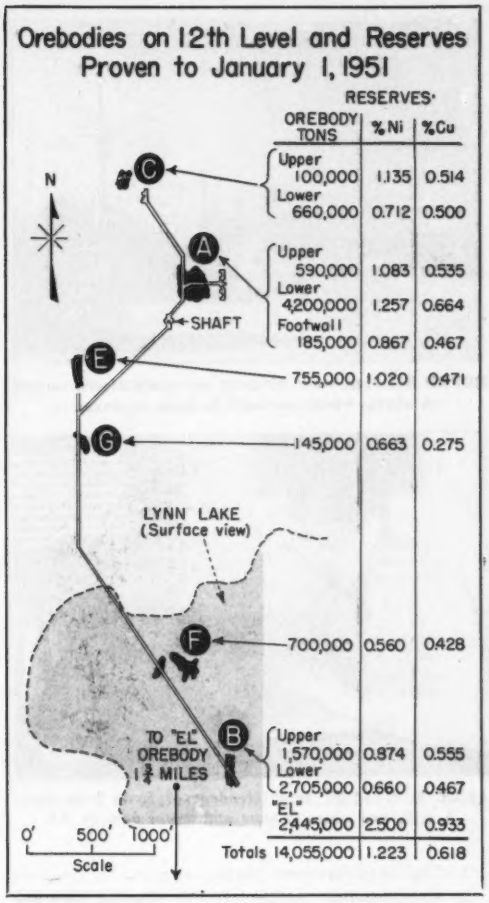
Discovery of Blind Orebodies. With only a lean showing of sulphides on a single outcrop, Sherritt used geophysical techniques which led to the development of seven blind orebodies.

Successful Use of Electromagnetic Surveying. For locating sulphide orebodies at Lynn Lake by geophysical means, Sherritt found that an improved electromagnetic method gave more reliable results than the magnetometer.

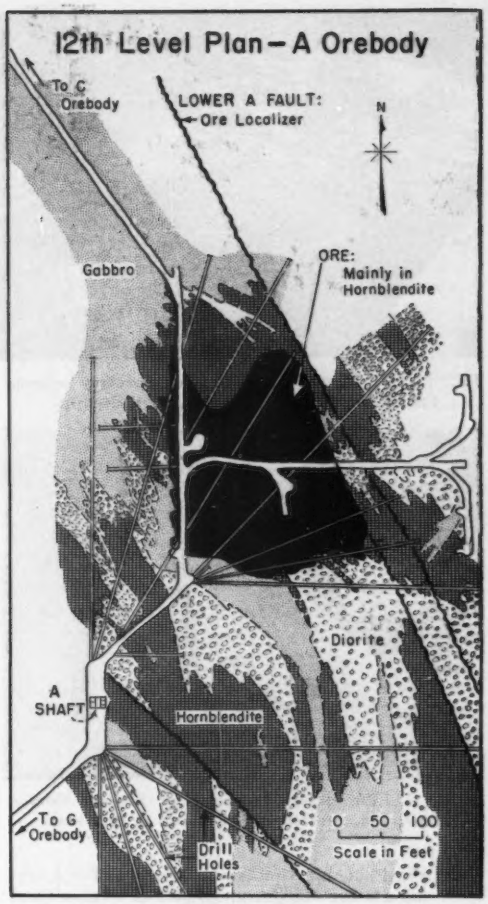
Addition to Sulphide-Nickel Reserves. Prior to Lynn Lake, only two companies, INCO and Falconbridge, had developed commercial operations on sulphide nickel in the Western Hemisphere. Sherritt's Lynn Lake discovery, now known to contain at least 14 million tons of reserve ore, ranks as No. 3.

Development of a New Process. Sherritt will refine its nickel concentrate by leaching it, and precipitating nickel and cobalt as powders.

The group of men who founded Sherritt Gordon Mines, Ltd. in 1927 had high hopes of developing the Sherridon copper-zinc orebodies to a point that would carry the venture for decades. The hope didn't



with 14-million tons of reserves . . .



in diorite or hornblendite zones . . .

Lynn Lake Nickel-Copper

materialize, however, and the mine actually lasted for only 15 years.

Back in the 30's, management saw that if the company were to keep going, it would have to find a mine to replace the Sherridon. The company had a good staff, and owned mine and mill equipment that could effectively aid a new enterprise.

Prospecting on a large scale in the area north of Granville Lake started in 1937 and was carried on continuously every season following that. In late 1941, prospecting for Sherritt, Austin McVeigh found a 2-ft. by 6-ft. exposure of sulphides on a rock knoll north of Lynn Lake. He took grab samples. Assays showed a fair nickel content with low copper values.

Just before the 1941 freeze-up, Eldon L. Brown and Austin McVeigh went in to Lynn Lake to look at the discovery. It looked promising. In 1942, McVeigh returned, prospected the general area with a magnetometer, and found a strong magnetic anomaly 3½ mi. west of the outcrop.

To prospect the Lynn Lake area, they'd need to fly in men and equipment in quantity, and they'd have to stake a large block of claims to protect the discovery. At that time the needs of World War II had cut deeply into air-transport service, so they decided to keep the discovery a secret until necessary air service was available.

They kept the secret until 1945, and then returned to Lynn Lake. Drilling the magnetic anomaly 3½ mi. west of the outcrop, they found only magnetite. Then the drill was moved to a weaker anomaly near the outcrop.

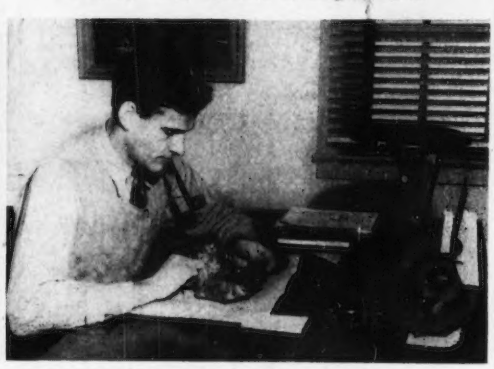
In their first hole, drillers hit low values in nickel and copper—nothing commercial. They lost the second hole in overburden, and moved the drill to sink a vertical hole at the center of the anomaly.

Lynn Lake Will Use the Men, Equipment and Town from Sherridon

THE PLANT AT A SHAFT rests on discovery outcrop. Letters are Millsite, Pilot mill, A&E deposits.

BRRRR-R!! Men walk gingerly up camp street toward A shaft, wisely enclosed to keep it warm.

H. H. HALES, general manager of Sherritt Gordon Mines, Ltd., started with Sherritt as mill supt.



ALAN E. GALLIE, superintendent of Lynn Lake Div.: A mill, two mines, a town and power dam by '53.

The third hole hit what is now known as the A orebody, cut ore for 100 ft., and Sherritt went all out to find out what it had at Lynn Lake.

After locating additional anomalies, Sherritt tested them by diamond drilling. By 1948 the crews had drilled a total of 199,614 ft., and had proved 8,300,000 tons of ore averaging 1.514% Ni and 0.687% Cu.

In the flat, musked-covered Northland, shaft sinking is the only way to develop a mine for production. But the expense of a shaft can't be undertaken lightly, because it commits a company to a course from which it cannot easily draw back. However, to block out reserves adequately, and to get enough representative ore for metallurgical work, the A shaft had to be sunk.

The end result of successive shaft sinking and drilling was that Sherritt proved the A orebody in classical fashion (see sketch of drilling patterns). Reserves now total 14-million tons averaging 1.22% Ni and 0.62% Cu. And, in the meantime, ore had been mined to feed a pilot mill at Lynn Lake which produced adequate concentrates for subsequent hydrometallurgical research and pilot-plant testing.

Geologically, the Lynn Lake area consists of pre-Cambrian sediments, metamorphics, and volcanics which are intruded by hornblendite-norite-diorite-gabbro plugs of later pre-Cambrian age.

The pentlandite-chalcopyrite-pyrrhotite ore was apparently localized by three features:

1. The basic igneous plugs.

2. Hornblendite (norite) and/or diorite. Ore has not been found in the gabbro.

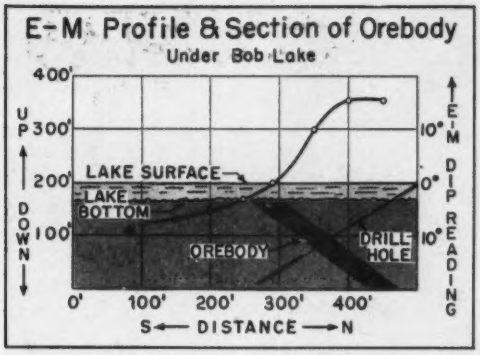
3. A series of steep northwest faults which Sherritt's geologists believe extends from the EL through the A zone (and would thus cut the two major igneous plugs).

Incidentally, when the word got around in 1947 about some of the high-grade ore (up to 7% Ni) in the El orebody, the region was overrun by prospectors. However, nobody else has found ore of any significance. It seems that Brown and his men staked claims covering all the area where faulting had localized ores.

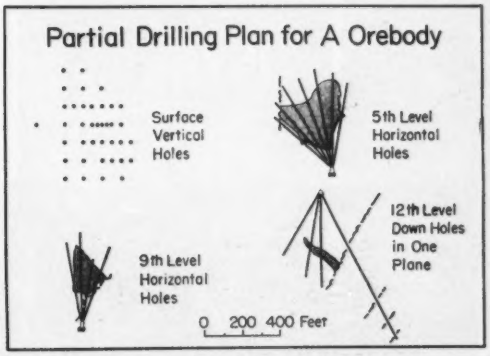
Electromagnetic Unit Finds Ore

Electromagnetic surveying, as originally tried out in the twenties was too sensitive. Designed to pick up sulphide orebodies, it also picked up phantom anomalies caused by variations in overburden, water soaked gravels, and other conductors.

Dr. Stanley Davidson of Falconbridge Nickel experimented with the electromagnetic system and decided that the oversensitivity was caused by use of the wrong frequency. He experimented with frequencies and found that 1,200 cycles reduced the number of "phantom" anomalies that came from water courses, and still picked up other mineral conductors.



ZERO DIP INDICATES AXIS of orebody. Dips on left are positive, but arbitrarily plotted below zero.


Partial Drilling Plan for A Orebody
Surface Vertical Holes
5th Level Horizontal Holes
12th Level Down Holes in One Plane
9th Level Horizontal Holes
0 200 400 Feet

SHERRITT USED DIAMOND DRILLING and underground work as complementary tools.

He used the improved unit very successfully in the Sudbury area.

R. W. "Bob" Drybrough, electrical engineer and now general superintendent at Sherridon, talked to Davidson, looked at his electromagnetic unit, returned to Sherridon and built one.

Specifications of Sherritt's E-M Unit:

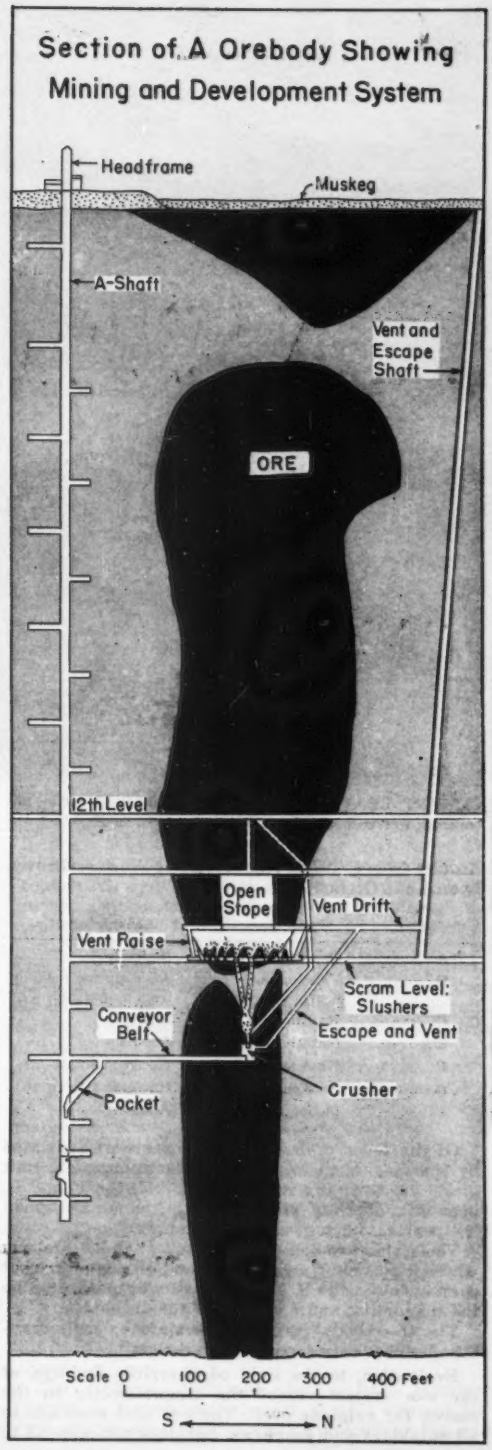
Primary Coil

Shape	Triangular, 25 ft. on side
Turns	10
Wire Size	No. 14
Frequency	1,200 cycles
Volts	180 to 200
Amperes	8.5
Power	150 to 200 w.
Position	Vertical

Secondary Coil

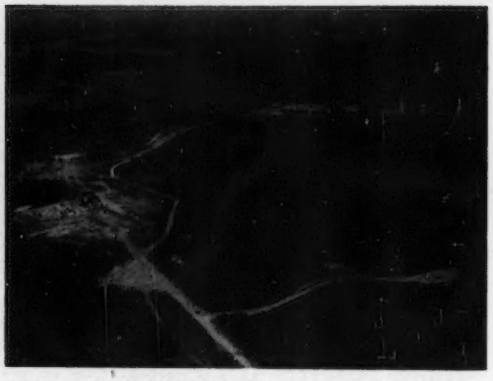
Shape	Circular
Diameter	20 in.
Normal Position	Horizontal

Current in the secondary is induced from the primary and, in opposite phase, from the sub-surface conductor. Using earphones, the operator tilts the secondary coil until he hears no tone, and records the dip angle (horizontal equals 0°) of the null reading. In the plotted e-m profile, zero and high dips indicate the axis and trend of the conductor (or orebody).



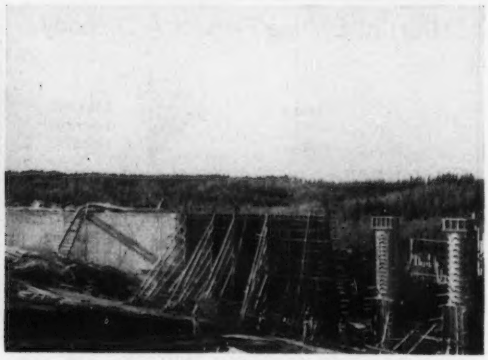
Sherridon → **Lynn Lake**

PERMANENT HOUSES en route from Sherridon go to →



LYNN LAKE TOWNSITE (left), west of A shaft (right).

CEMENT LEAVES SHERRIDON freighting yards uncovered, but will stay bone dry because of cold. →



IT GOES TO LYNN LAKE for use in the Laurie R. power development. Spillway for this 7,000-hp. dam on right.

Results from E-M and Magnetometer Work on Proven Lynn Lake Orebodies

Orebody	Magnetometer	Electromagnetic
A	Pos. Anomaly	Anomaly
B	False anomaly from nearby magnetite	Anomaly (no reading from magnetite)
C	No Anomaly	Anomaly
E	Negative Anomaly	Anomaly
F	No Anomaly	No Anomaly
G	No Anomaly	No Anomaly
EL	Strong Pos. Anomaly	Anomaly

Of the seven orebodies, only three were indicated by the magnetometer, but the electromagnetic unit picked up five; the two it didn't find, the F and G, apex at a depth of almost 1000 ft., which is beyond the penetration zone of the e-m outfit.

The magnetometer was "fooled" at the B orebody where it picked up a nearby deposit of magnetite that overshadowed the B. The e-m unit was unaffected by the magnetite, and so revealed the sulphides.

The C orebody gave no indication by magnetometer, but was *discovered* with an e-m unit.

Evaluation, in the light of Sherritt's findings, of the e-m system versus the magnetometer in the search for sulphide ores: The e-m unit responds to all sulphides and graphites, but does not respond to magnetite. The magnetometer responds to magnetites and pyrrhotites, but responds only slightly to graphites and sulphides. So in prospecting for sulphides, Sherritt's preference is always for the e-m unit, though the magnetometer may be used to differentiate graphite.

Later, in prospecting some of the large frozen lakes in northern Manitoba, Sherritt mounted each e-m unit in two heated cabooses on sleds. Operators took readings every 50 ft. on lines 200 ft. apart, and averaged 300 acres of coverage per 8-hr. shift. Such a unit was found to be economical only on large level surfaces. The time spent getting the outfit in to a lake precluded its use on small lakes which a party on foot could cover more cheaply.

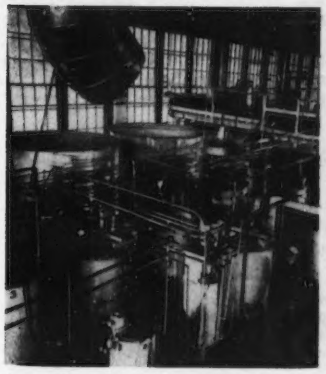
New Process Developed

Having proved commercial bodies of ore, Sherritt had now to prove that it could make a profit on that ore.

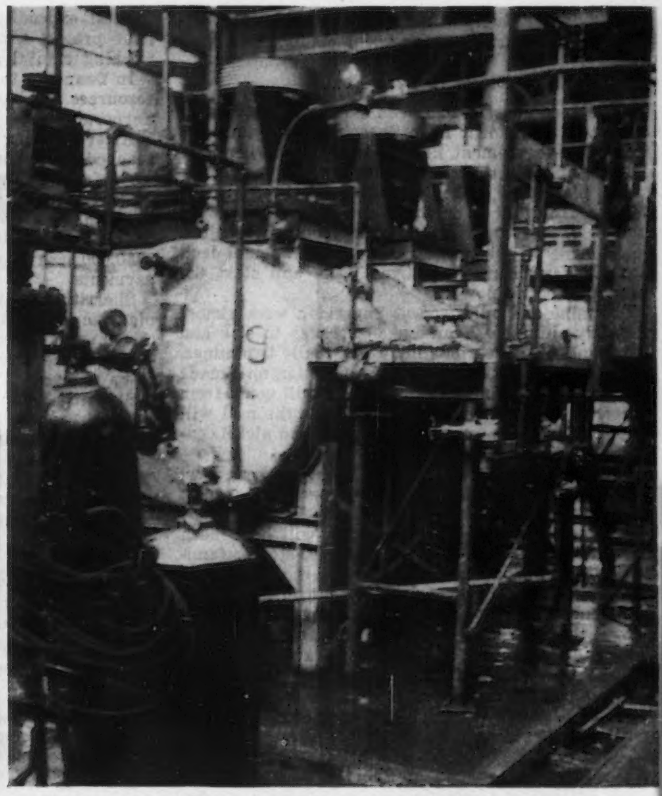
Early tests showed that by selective flotation, Lynn Lake ore could be separated into a nickel concentrate and a copper concentrate of higher grade than those produced from Sudbury ores. Hudson Bay at Flin Flon, Manitoba, would buy the copper con. But transport, smelting, and refining costs of shipping the nickel concentrate to the only available nickel smelter and refinery in the far-off Sudbury district left too little margin. A nickel smelter and refinery

Pilot Plant Proved and Improved the Process

INSIDE FORM for turbine draft tube of power dam.



IN THIS 1,200-LB.-PER-DAY PILOT PLANT, Sherritt proved its process.



IN THIS 4,000-LB.-PER-DAY PLANT, it will gather final data for design of the full-scale plant in Alberta.

for Sherritt were virtually eliminated—too costly.

So Sherritt retained professor Frank Forward of the University of British Columbia with the idea of adapting the Nicaro Nickel leaching process to treatment of sulphide concentrate. After a little work, Forward estimated the cost to be about the same as for conventional treatment—too high.

Then Forward tried some short cuts, one of which was elimination of roasting. Direct leaching with ammonium carbonate was unsuccessful, and successive experiments with other ammonium compounds were negative too. Finally he tried leaching with ammonia —it worked!

Enough laboratory work was then done to convince management that the process could be developed on a commercial scale, and that its low costs would allow profitable operation of Lynn Lake.

Enlisting the aid of the Mineral Dressing Div. of the Canadian Bureau of Mines, the company began a campaign to develop the laboratory process into a continuous-flow process and eventually into a full-scale process.

Chemical Construction Co. was retained to design a pilot plant for processing Lynn Lake concentrates, and to enlist its knowledge of leaching and precipitation of metals. To produce the concentrate, Sherritt built a 50-ton pilot mill at Lynn Lake.

The pilot plant at Ottawa began operating in 1949. Because Sherritt's success now depended on early success of the process, the men worked with an urgency. By 1951 they had developed it from laboratory to continuous flow. And they had obtained the data needed for building a full-scale plant.

For reasons of industrial security, little can be said about the process. Basically, it consists of simultaneous oxidation and ammonia leaching of the green concentrates to produce soluble nickel, cobalt, and copper compounds. Through use of minor amounts of sulphuric acid and a reducing agent in following stages, nickel and cobalt are recovered in powder form. The nickel powder, about 99.83% Ni and 0.15% Co, exceeds the purity of electrolytic metal currently marketed. Ammonium sulphate is recovered as a valuable by-product.

In December 1950, the company retained Ford, Bacon, & Davis to certify the economics of the entire Lynn Lake operation. Battelle Memorial Institute, in an associate capacity, examined the leaching process and confirmed Sherritt's findings. The advantages of the Sherritt-Gordon process, as opposed to conventional methods, are:

1. Low operating costs.
2. High recovery of pure cobalt.
3. A 75% recovery of sulphur as ammonium sulphate.

The staff at Ottawa, under division manager Charles A. Hames, must by Jan. 1, 1951 start on the final design of a plant to be completed by the end

of 1953. The refinery will be built at Edmonton, Alberta, near natural gas for making ammonia.

Move to Lynn Lake

Since 1945 Sherritt had been moving an increasing amount of equipment from Sherridon to Lynn Lake each year—equipment not needed at Sherridon. By the end of 1949, the mining plant at the A orebody was in place. The orebodies had largely been proved. Results from the new metallurgical process were favorable. Surveys had revealed good power sites. Considering all this, management made the final decision: Move Sherridon to Lynn Lake and start developing electric power.

The mine and mill used at Sherridon were almost perfectly suited to Lynn Lake—both as to size and as to type. The Sherridon mine was really two mines, a small one and a large one; the flotation mill made two products. Lynn Lake production will come from the large A shaft, and the smaller EL; the mill will make two products, copper concentrate and nickel concentrate.

In the three-month winter hauling season from January to March, 1950, the move began in earnest; in '51 it continued; and in '52 and '53 it will be completed. Everything at Sherridon will have been moved to Lynn Lake—houses, schools, stores, families, all equipment.

Sherritt's initial power development on the Laurie River includes two completed storage dams which control the Laurie at its sources, Russell and Laurie Lakes; diversion of a neighboring river into the Laurie; and erection of a 7,000-hp. hydroelectric dam at a point downstream. Three more damsites (one at 7,000 hp. and two at 2,000 hp.) have been picked for possible development.

The mining method that will be used at Lynn Lake is similar to that used at Sherridon. Miners will break ore by long-hole drilling in sub-level stopes. The orebodies are shaped much like wedges or funnels. Thus, broken ore will fall to the stope bottom and will then flow through finger raises to draw points in slusher drifts. Slushers will collect the ore, drop it through transfer raises to an underground crusher station. The crushed ore will be carried by conveyor belt to the shaft for pocketing and hoisting.

Total expenditure required to complete the Lynn Lake project will be about $35-million exclusive of working capital and contingency requirements.

In financing the project, Sherritt is using its own resources and has the assistance of Newmont Mining Corporation.

After proving 14-million tons of ore, Sherritt reached an agreement with Canadian National Railways for a 147-mi. railroad from Sherridon to Lynn Lake. CNR will pay the first $10-million of the cost; the Canadian Government will underwrite the cost in excess of $10-million; Sherritt will pay CNR $350,000 each year for 20 years over and above haulage payments.

Sherritt is optimistic about the nickel industry it plans to enter. Demand for nickel currently exceeds the supply, but despite the abnormality of present demand, the trend of nickel consumption is likely to be upward.

Sherritt's planned annual output (8,500 tons by 1955) is about 5% of the world's current nickel output, and thus will not constitute a threat to market stability.

A final favorable factor is that Canada allows a new mining operation 3½ years before it starts taxing the operation's income—½ year for "tune-up" plus 3 years of production.

This is Sherritt's Timetable:

1952—Design and start construction of refinery near Edmonton, Alberta.

1953, Nov. 1—Railroad, mine, mill, power plant completed. Start of production.

1954—75% of full production.

1955——Full production.

- **1,500 tons of ore from A orebody daily.**
- **500 tons of ore from EL orebody daily.**
- **260 tons of nickel concentrate daily.**
  - **12.0% Ni**
  - **1.48% Cu**
- **40 tons of copper concentrate daily.**
  - **0.75% Ni**
  - **28.0% Cu**
- **8,500 tons of nickel yearly.**
- **4,000 tons of copper yearly.**
- **300,000 lb. of cobalt yearly.**
- **70,000 tons of ammonium sulphate yearly.**

Faith Rehabilitates Another Philippine Gold Mine

By LAURENCE L. WILSON

THE FIVE PRODUCING PHILIPPINE gold mines will be joined by an old friend some time this year, when Baguio Gold Mining Co. gets back into production. The company, which has property adjoining Benguet Consolidated in Mountain Province, signed a contract in January with Engineering Equipment & Supply Co. for a complete power plant and mill installation of 400 tons daily capacity.

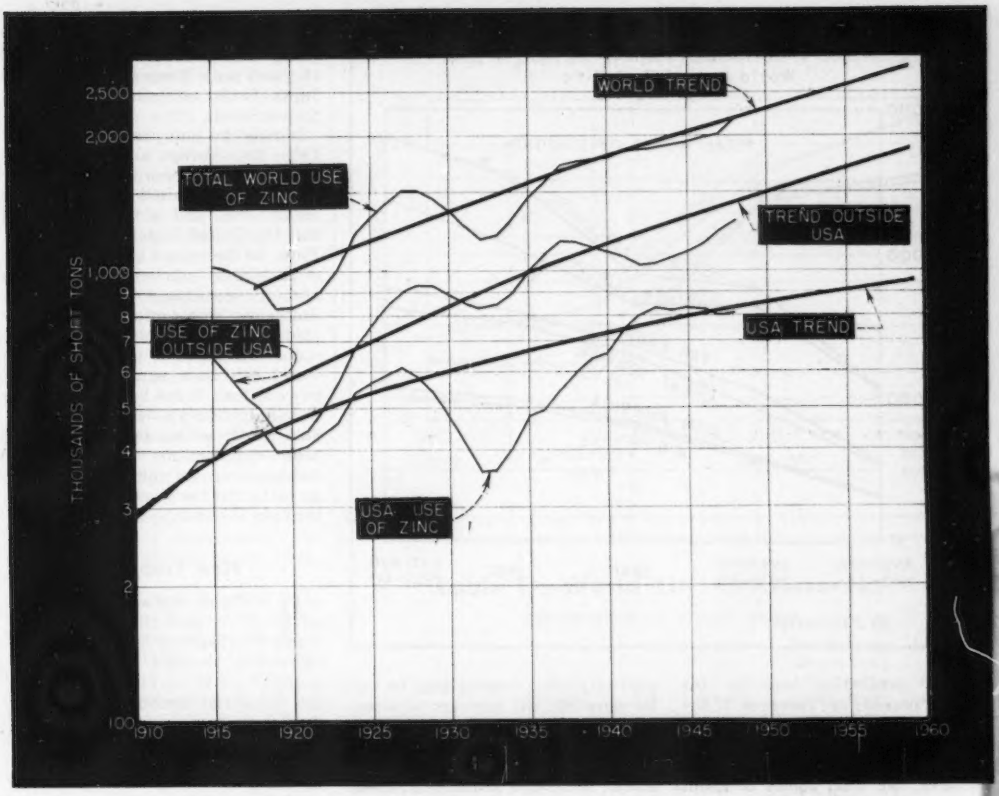
Prior to the Japanese occupation of 1941-45, the company successfully operated a 400-ton cyanide plant in the same district. It was destroyed, as were so many Philippine mills, by Japanese looting and U. S. Air Force bombing. The mine workings, being in heavy ground, were all badly caved. The present rehabilitation program, now nearing completion, has been directed by Frank E. Delahaunty, general supt., and R. W. Dunne, mine supt.

The new mill will go up on the site of the old Headwaters Mining Co. A three-compartment shaft will be raised from the old haulage tunnel to simplify ore transport.

Power will be provided by two diesel-electric units of 1,800 hp. The mill will use two-stage crushing, two-stage grinding, followed by cyanidation.

At the very beginning of the mining boom of 1932-37 in the Philippines, Headwaters Mining Co. disposed of its property to a group of Americans who organized the Baguio Gold Mining Co. Ward Graham brought the mine into production.

The ore mined before the war ran around 15 pesos per ton. Postwar exploration is said to have disclosed ore of a higher grade. With payments on its war damage claims and the proceeds from sale of stock, the company expects to build the new mill and get into production. Present officers of the company are: Henry A. Brimo, president; John L. Headinger, Nathan D. Noah, vice-presidents; P. E. Meyer, treasurer; I. O. Elegado, secretary; Amos G. Bellis, D. O. Gung, James O. Ross, directors; E. A. Perkins, legal advisor.



Steadily-growing world-wide demand for zinc makes it evident that . . .

We'll Have To Plan Now To Meet Future Zinc Needs

In this study, Mr. Shea concludes that increased mine and smelter capacity is needed, plus encouragement of concentrate imports.

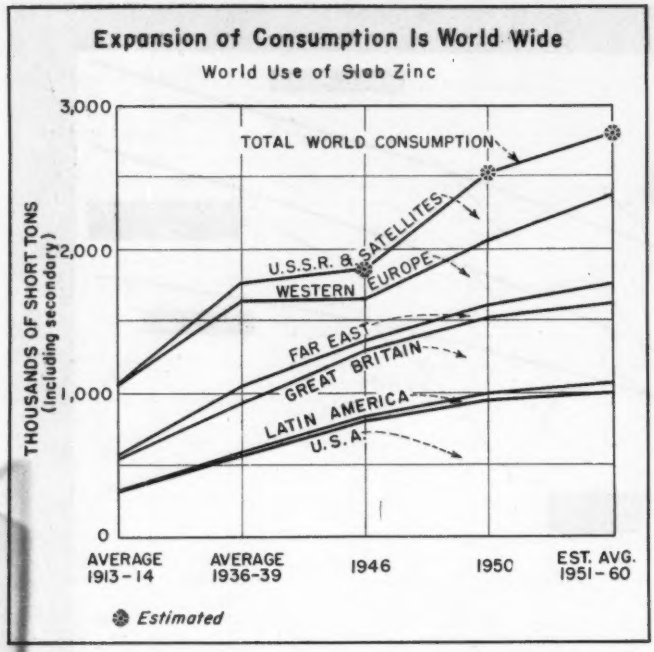
WILLIAM P. SHEA
Statistician
C. Tennant, Sons & Co., of New York

LOOKING TO THE FUTURE, the zinc position of the United States is far from comfortable. The gap between domestic production and consumption of zinc concentrates is widening and gives no promise of improvement. The apparent trend of world demand points to a growing deficiency of supply, to which demand will probably have to conform. United States smelter capacity is barely adequate to meet domestic requirements, and is inadequate for a national emergency.

The world's annual industrial use of slab zinc during the 37-year period 1913-50 increased from 1,100,000 short tons to approximately 2,500,000 short tons. The period includes the two World Wars, the industrial boom of the 1920's, the depression of the 1930's, and the post World War II industrial boom. This increase in world zinc requirements has been at an average rate of 2.25% per year. If continued, world requirements would be roughly 3,100,000 short tons by 1960 and 7,500,000 tons by the year 2000. It does not seem likely that the world's present reserves of zinc ore, known and probable, can continue to meet such a rate of increase in requirements during the second half of this century.

A more conservative estimate, based on United Nation's studies of expectable increases in population and on average living standards, places future world requirements of slab zinc at 2,800,000 short tons by 1960 and 5,200,000 short tons by the year 2000. Even these figures are very high in comparison to

Can we depend on Europe's smelters in another war? . . . .



present production and to the world's present ore reserves. If the maximum recorded zinc productions prior to 1950 of all individual zinc producing countries are added together, the total comes to about 2,400,000 short tons, a figure which includes secondary production in the various countries and an estimate of production in the Soviet Union and satellite states. Inasmuch as total world consumption during 1950 was slightly over 2,500,000 tons, it may be inferred that maximum production in terms of the world's present mine-smelter transportation facilities is already being utilized. In order to meet 1950 demands, the working stocks of zinc-producing countries were severely depleted—in the United States at the year's end, smelters' stocks were down to about three days' supply.

World requirements of slab zinc over the next 10 years, however, are expected to average about 2,800,000 tons or about 11% above the 1950 level. And beyond 1960, long-term trend lines indicate ever larger requirements. It may be anticipated that some part of this future demand will be filled by other materials. However, experience to date has demonstrated that basic industrial metals usually develop new uses about as fast as they yield place to substitutes. Another part of future demand may be met by more efficient recovery of secondary metal. In major part, however, it must be met from heretofore untapped sources of new metal, to be won probably at much higher than present costs.

Expanding World Economy

World War II set in motion a world-wide industrial development of extraordinary scope. The Industrial Production Index for the United States (Federal Reserve Board) rose from an average of 100 for the prewar period 1936-39 to 216 in Dec., 1950, and this rapid expansion has been paralleled more or less in other parts of the world.

Industrial use of zinc, which as a basic metal reflects and to a degree measures industrial activity, has been as shown on the chart above (the pre-World War I period is included to indicate the long-term trend).

Western Europe, taken as a whole, and Japan, which were formerly large users of zinc, in postwar years have lagged behind the rest of the world in this industrial expansion. During 1950 Western Europe's use of zinc, while showing a rapid recovery from the close of the war, was still only about 75% of the prewar rate of use. Japan in 1950 showed only about 80% of the prewar rate of use although it also was increasing rapidly as compared with 1946. During the next 10 years both Western Europe and Japan should reattain at least their prewar levels.

During the four years ended with 1950, the average annual increase in world use of zinc has been about 8%, in the United States alone about 5.7%, and in the world outside the United States about 10.8%. Thus, to the extent that utilization of this basic industrial metal is an adequate measure, while the United States has been contemplating with pride the heights attained by its industrial machine, the rest of the world has been expanding nearly twice as fast. It has been this world-wide industrial growth and its probable continuation, as well as current requirements of zinc for defense purposes, that have been responsible for the growing unbalance between world supply and demand.

New Problems

Up to the middle of 1950 it seemed probable that the world as a whole was heading into a period of increasing demand for consumer goods of all sorts, and the increasing industrial demand for zinc reflected, in part, capital investment to provide the means of meeting this increasing demand. The activation of the cold war in the middle of 1950, however, has given rise to an entirely new kind of forward planning. Currently the world contemplates an economic future which will be determined by one of three distinct possibilities:

(a) Continuation of the present "cold war."

(b) Initiation of global warfare on sufficient scale to be termed "World War III."

(c) Ironing out of the present world tensions so that the world may really enjoy peace for a period of 50 years or so.

In the event of either (a) or (b), the world requirements for zinc, either for creating munitions or for meeting the enormous wastage which would be involved in a third world war, would no doubt necessitate all the zinc that the world's mines and smelters would prove able to produce and transport to market under partial or complete wartime conditions. During the two most recent world war periods, the world's production-consumption channels for zinc were severely disrupted, mainly because of the location in Western Europe of

. . . . . This article starts on page 79

a considerable proportion of the world's zinc smelting capacity.

Statistics of mine-smelter production and of actual use during these periods are given in the adjacent chart at right.

Some part of mine production (equivalent to 100,000-150,000 tons of recoverable zinc) ordinarily goes into the production of American-process zinc oxide, lithopone, salts, etc. But over and above this, it is apparent that an important tonnage of wartime mine production was unavailable for actual use at the very time when demand was most urgent. Thus, World War III would probably curtail the availability of zinc for actual requirements, despite larger mine production.

A resumption of peace, making possible a continuation of world-wide industrial expansion, would make an expanding market for zinc probable over the long term.

In the charts of the world zinc position for the immediate and longer-term future on p. 82, it is assumed:

1. That Europe and Japan will reattain their respective pre-World War II rates of use of zinc.
2. That the present all-time high rate of production from the world's mines and secondary sources *can* be increased on the average by about 10% during the next 10 years.
3. That the average market price of zinc will be sufficient to support such an increase in production.

Any surplus production over industrial requirements during immediately future years would be needed to re-establish smelter and consumer working stocks.

With respect to the United States alone, the overall zinc position shapes up about as shown on p. 82.

Here also, any surplus of zinc available to the U. S. A. over actual use requirements will be needed to re-establish smelter-industry working stocks. It may be noted, however, that in order to meet the longer-term use requirements, the United States, in prospect, must contrive to obtain from foreign sources about 350,000 tons of zinc per year whether in concentrates or as slab. In order to obtain these supplies, the United States must compete with foreign users of zinc.

Based on information derived from published sources, the known zinc ore deposits of the world may be summarized as in Table I.

Postwar Mine Developments

UNITED STATES. Mine production of recoverable zinc in the United States established its high watermark as far back as 1926 with 775,000 short tons (average price 7.34¢ per lb.). Highest production during World War II came in 1942 with 768,000 short tons (ceiling price 8.50¢ per lb., average price including premium payments 9.06¢ per lb.). Thereafter U. S. mine production displayed a pronounced downward trend despite rising prices for zinc. Production in 1950 was 618,000 short tons and average price was 13.85¢ per lb.

Important features during postwar years have been the declining production from the Tri-State district and from the Franklin mine in New Jersey. These have been partly offset by increased production from mines in the Rocky Mountain states, much of which, however, is at high cost. Encouraging factors for the future are the bringing into production of the new and large Friedensville mine (New Jersey Zinc Co.) in Pennsylvania, increased production schedules at the St. Joseph Lead properties in New York, and a prospective increase in production from Tennessee.

RUSSIA. The opening up of large deposits of zinc ore in the Kazakstan section of Siberia is reported to have assured large-scale

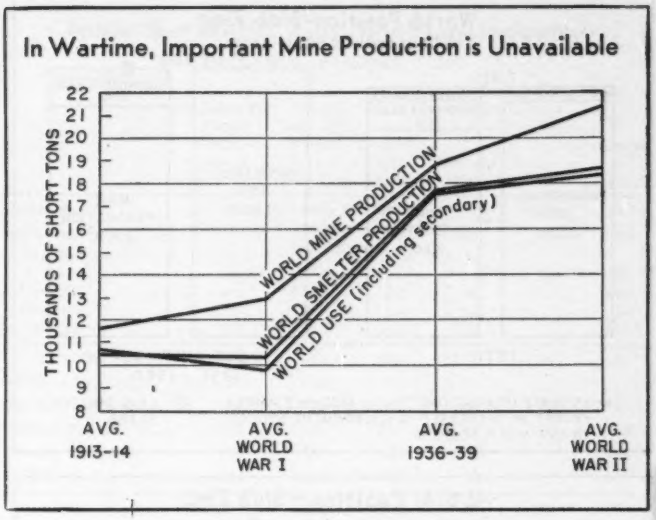


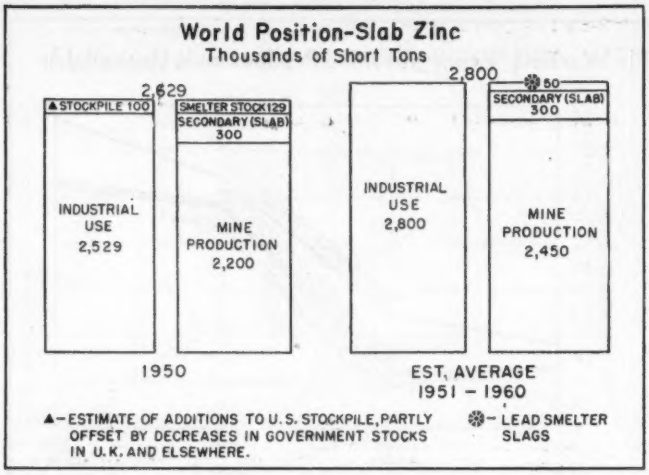
Table 1—World Zinc Ore Reserves

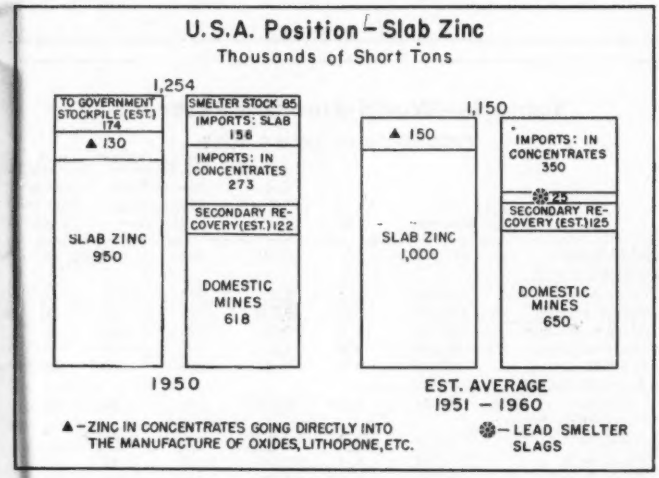
THOUSANDS OF SHORT TONS

	Ore Reserves	Av. % Zinc	Recoverable Zinc at 87.5%	Est. Recovery Zinc in Conc. 1950 Average	1951–1960	Indicated Life of Reserves (Years)
United States	297,500	4.2	10,930[1]	618[1]	650	17
World Ex-U. S. A.						
Latin America	68,000	12.3	7,300	311	400	18
British Empire	270,000	8.8	20,800	561	700	30
Western Europe	30,200	11.1	2,920	307	400	7
Eastern Europe	31,200	9.0	2,570	135	140	18
U.S.S.R.	87,500	9.4	7,200	300	350	21
Africa Ex-British Empire	100,000	2.0	1,750	65	70	25
Far East Ex-British Empire	1,300	10.0	120	57	80	..
Ex-U. S. A.	588,200	8.3	42,660	1,736	2,140	20
World Total	885,700	6.9	53,590	2,354	2,790	19

[1] In the United States recovery of zinc in concentrates there is included some 130,000-150,000 tons per year which represents the recoverable zinc content of concentrates used directly in the manufacture of zinc oxide, lithopone, etc., and which never appears as slab zinc.

WANTED: More Western Hemisphere smelting capacity. . . . .





production of zinc in the U.S.S.R. In addition, through satellite allies in Eastern Europe, Russia now controls about 50% of Europe's known zinc reserves, including the great Silesian field which is now wholly within Poland's borders.

CANADA. Already second only to the United States in volume of zinc ore production, Canada's importance in this field seems destined to increase. There are many promising developments under way. In particular the opening of the Barvue mine, which is expected to become Canada's third largest producer, is making Quebec an important factor in zinc production.

AUSTRALIA. Further development of the New Broken Hill deposit has added to Australia's zinc ore reserves an estimated 30-million tons carrying 12.0% lead, 15.0% zinc, and 2.0 oz. silver. J. R. Govett, chairman of the Zinc Corp., stated on Jan. 23, 1947, that the Broken Hill deposits are capable of much larger production than heretofore and predicted that they will be producing after 2000 A.D.

SOUTHWEST AFRICA. The Tsumeb deposit, formerly worked mainly for its lead, has been developed by American-British interests and brought into large-scale production. Developed and probable ore is put at 5-million tons, with ore in sight carrying 10% copper, 18.5% lead, and 10.5% zinc.

MOROCCO. French interests, assisted by financial participation by Newmont Mining Corp. and St. Joseph Lead Co. and with some help from ECA, have developed the Zellidja mine in Morocco with ore reserves assaying about 7% combined lead and zinc and having an estimated recoverable metal content of about 2 million tons. Zellidja is currently producing at the rate of over 1 million tons of ore per year and it is expected that this rate will be doubled by 1954.

LATIN AMERICA. A feature of the world's zinc industry during the past 25 years has been the growing importance of Latin American mine production. From an average annual production of 15,000 tons of recoverable zinc (all from Mexico) in the 1922-24 period, production has grown to about 340,000 tons per year. Further, this production is capable of a large increase, especially in South American countries, if political conditions permit and if metallurgical and transportation problems are solved.

GENERAL. Over and above intra-country developments of mining properties, however, there has been a gradual improvement in the grade of zinc concentrates produced throughout the world with the result that the general average has probably increased from 50% to 52.50% zinc content. Furthermore while it has been customary to calculate on the basis of recovering 85% of the zinc content of the concentrate, it is probable that metallurgical improvements will result in recovery of nearer 87.50% within the current decade.

* * *

Outside of Russia, the world apparently must rely for its increasing zinc requirements mainly upon the mines of Latin America and of the British Empire, especially Canada and Australia. Fortunately these are capable of much larger production schedules than those now in effect, provided the price of zinc is such as to encourage the large capital investment necessary.

The world's zinc smelting industry, together with the international movement of recoverable zinc in concentrates during 1950, is summarized in Table 2.

The total smelter capacity of 3,100,000 tons, if fully used, would require 6,800,000 tons of zinc concentrates. Current world total mine production available to smelters is only about 80% of this figure. Partly because of the U. S. tariff on zinc concentrates, some producers outside the United States who formerly shipped to smelters in the U. S. have recently been shipping their concentrates elsewhere. As a result some U. S. smelters are not now able to work at full capacity.

. . . . . This article starts on page 79

Critical U. S. Position

Since 1913 the United States twice has been called upon to meet world crises in zinc supplies. These crises arose primarily because of the concentration in Western Europe of a large portion of the world's zinc smelting capacity. In 1914 and again in 1940 Western Europe was shut off from normal supplies of zinc concentrates. Moreover, actual military operations necessitated the closing down of many European smelters. The U.S. alone had sufficient reserves of capital, zinc ore, cheap fuel, and skilled labor to meet these emergencies.

Between 1914 and 1916 the United States doubled its smelting capacity to 900,000 short tons, as compared with total world consumption in 1913 of 1,100,000 tons. Because U. S. mines alone could not supply sufficient concentrates, and because the U. S. tariff policy after 1920 hampered profitable use of foreign concentrates, much of this new capacity remained as an uneconomic excess to be carried by the U. S. zinc industry for the next 20 years. Nevertheless, between 1940 and 1943 the U. S. found it essential to add a further 25%.

Should a third emergency now develop, it is probable that Western Europe's zinc smelters will again, and promptly, become war casualties. Including those in U. K., they are currently producing at the rate of 683,000 short tons. In the United States there is a present smelting capacity of 1,100,000 short tons, domestic requirements exclusive of stockpile are 950,000 short tons, domestic mines (after providing for oxides, etc.) are producing 520,000 short tons of recoverable zinc in concentrates.

The U. S. zinc position during a third world emergency might be compared with the two previous emergencies, as shown in Table 3.

U. S. Needs Added Accessible Smelting Capacity

The U. S. was able to meet both previous emergencies by huge investments of capital made in the most expensive and wasteful manner, i.e., under conditions of frantic haste with cost a minor consideration. In each case, moreover, the U. S. was afforded a leeway of more than two years before itself becoming an actual combatant. Above all, in each previous emergency the U. S. smelters had access to fairly adequate supplies of zinc concentrates either from domestic sources or from neighboring countries or from overseas.

To meet World War III requirements, however, the U. S. faces:

(1) Insufficient smelting capacity to meet the United States' own war requirements of zinc, let alone supplying its allies' needs.

(2) Inadequate supplies of concentrates from domestic mines.

(3) The handicap the import duty has imposed on domestic smelters in competing for foreign concentrates. Domestic production of zinc concentrates is sufficient to supply only two-thirds of the existing smelter capacity of the U. S. Consequently, it will be necessary to import at least one-third of our concentrate requirements from now on. The tariff of 0.6c per lb. compared to any price likely to exist in the future is of no practical value in sustaining domestic production. It has, however, operated effectively as a subsidy to foreign smelters in competing against the U. S. for foreign concentrates.

In view of the above considerations, the following courses of action are warranted:

A. The import duty on zinc concentrates should be eliminated in order to remove a handicap to U. S. smelters in bidding for foreign concentrates.

B. Encouragement should be given to increase mine production, domestic and foreign.

C. To safeguard national security, steps should be taken to increase domestic zinc smelter capacity.

Table 2—World Zinc Smelting Industry

THOUSANDS OF SHORT TONS

	Capacity for Annual Production of Slab Zinc	Est. 1951 Production of Slab Zinc	Supplies of Zinc (Recoverable) in Concentrates: Domestic Production	Exports Net	Imports Net	Available to Smelters
United States	1,100	950[1]	660	...	203	730[2]
Latin America	75	75	340	265	...	75
British Empire						
U. K.	88	188[3]	...	...	88	88
Canada	240	240	330	90	...	240
Rhodesia	26	26	50	24	...	26
Australia	110	110	210	100	...	110
Total Br. Emp.	464	564	590	214	88	464
Africa ex-Br. Emp.	36	36	65	65	...	...
Far East ex-Br. Emp.	45	45	60	15	...	45
Western Europe	829	495[4]	300	...	190	490
Eastern Europe	251	135	135	...	...	135
U. S. S. R.	300	300	300	...	...	300
	1,461	1,011	860	80	190	970
World Ex-U. S. A.	2,000	1,650	1,790	559	358	1,509
World Total	3,100	2,600	2,450	559	481	2,239

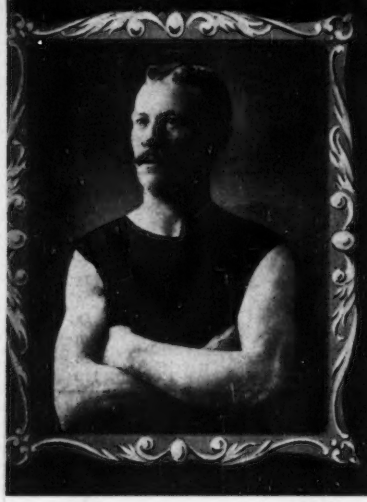
[1] Includes 120,000 tons of secondary zinc, and 100,000 tons derivable from lead, smelter fume and from government stocks of zinc concentrates.
[2] After deducting an estimated 133,000 tons of recoverable zinc in concentrates going directly into the manufacture of oxides, lithopone, etc.
[3] Includes 100,000 tons of secondary zinc.
[4] Includes some secondary zinc.

Table 3—U. S. Zinc in Wartime

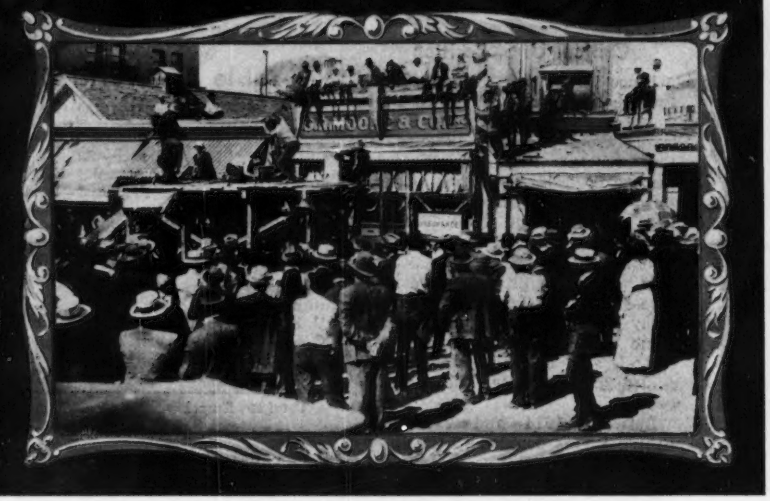
THOUSANDS OF SHORT TONS

	Mine Production Plus Secondary	Domestic Industrial Requirements	Smelter Production	Av. Price Per Lb., Cents E. St. Louis
World War I				
Av. 1915–1918	700	500	599	10.58
World War II				
Av. 1940–1945	793	957[1]	858	9.28[2]
World War III	700	1200–1500	1200–1500	19.50[3]

[1] Including requirements for oxides, etc.
[2] Average price during six-year period, including premium payments during 1942-1945.
[3] Current price.



FRED YOCKEY, peer of contest drillers, whose single-hand record of 23¼ in. in 15 min. was never beaten.



ATTENTION OF THE AUDIENCE is riveted on the Richie-Sander drill team which participated in the famous drilling contest in Tonopah, July 4, 1909. Close-up of the drillers is shown on the opposite page.

The Real Facts About Those Famous Old Hand-Drilling Contests

WHEN YOU TALK about speed records in hand-drilling contests, you want to be sure of your facts—even to the 1/32 in. per minute. Such statistics are sacred ground to the supermen who participated in the famous single-hand and double-hand drilling contests some 40-odd years ago. We found this out after publishing some interesting drill-contest results last year (See *E&MJ* Nov., 1950 and July, 1950), only to be corrected by our good friend Atha Albert Richie, whose choice comments we are privileged to present below.

TO THE EDITOR

Engineering and Mining Journal

A few days back I received a clipping from Professor Jay A. Carpenter, director of the Nevada State Bureau of Mines; also director of the Mackay School of Mines of the Nevada State University in Reno.

With the clipping was a note saying that he knew that I would be interested in the data concerning the rock-drilling records, as I had drilled in 15 contests in the different camps of Nevada.

The clipping was from the *E&MJ*, Nov., 1950, which told of a contest held recently in Tonopah and the drillers had drilled 1.506 in. per minute, and then remarked that the famous Pickens and Page team had drilled in the same rock 38 years previous and had drilled 3.029 in. per minute or a total of 45 7/16 in. in the 15-minute contest.

All of this is perfectly correct, but it then goes on to state that Chamberlain and Maka (it should be Make) had drilled 46⅝ in. in Gunnison granite at Bisbee, Ariz. I believe that there is considerable error there. The contest in which Chamberlain and Make made the great record was held at the Mining Congress at El Paso, Tex., in 1903, and I believe that that was the only contest in which Chamberlain and Make drilled together.

Just before the end of 14 minutes, Chamberlain laid his hammer down and said, "Carl, we have these fellows so badly beaten we never will get another bet if we finish the 15 minutes." They had drilled 42¼ in. Had they continued on they probably would have drilled 45¼ in.

The clipping also states that Fred Yockey drilled 26⅝ in. at Bisbee with a single jack at the same time. I believe there is an error there also. Fred drilled at the Mining Congress the next day after Chamberlain and Make made their record. I have a paper before me as I write this and it states that Fred drilled 23¼ in. The mining world was amazed, and it was thought the record would never be beaten. It never was! However, Fred drilled that day with ⅞-in. steel and from that day forward all the single-hand contests were drilled with ¾-in. steel. I have stopped to figure out that Fred would have drilled 31 in. had he drilled with ¾-in. steel.

I have another paper in front of me, *The Butte Evening News* of Aug. 10, 1909. There is an account of a drilling contest held there the day before in which Pickens and Page drilled 43⅞ in. and beat Ross and McNichols by the hair's breadth of 1/32 in.

The same paper states that Bradshaw and McNichols had drilled 45⅛ in. in the same rock the year before.

I knew most of these fellows well. I worked in a hole in the ground in Wyoming with Big Jim Pickens. He was a tremendous man, probably 6 ft. 2 or 3 in. tall, and weighed 240 lb. He was the largest of the big men and probably the best of the bunch as he drilled with McNichols, Bradshaw, McIvor, and Page. I don't believe that after he got in the big company he was ever beaten.

However, he drilled at Grand Encampment in Wyoming and was not even in the money. He started out as if he was killing a snake or whipping a dog and all he did was split the air.

I tramped over the gulches and hills in Wyoming with him hunting blue grouse. I thought he had had such

ATHA ALBERT RICHIE, contest driller and author of this article, poises his hammer for a haymaker in the famous drilling contest at Tonopah on July 4, 1909. His partner, Fred Sander, hangs onto the steel. They won second money in this contest. Richie won first money in the single-hand contest which followed shortly after.

luck and made such a poor showing at Encampment that he never would try again. He left the mine, and the first thing I knew I had a card from him saying he had drilled with McNichols in Butte and taken first money.

About Fred Yockey. I batched with him in Goldfield, in National, in Seven Troughs, and in Round Mountain. When a fellow bakes a pal's flapjacks for several months, he of course gets acquainted with him.

He drilled in Tonopah on Labor Day, 1905, and he was fortunate to draw the last place on the rock. After he had everybody beaten a mile, he imitated every man who had preceded him in the contest.

There was a man from Bodie who changed his drills every minute whether he had them down or not. When the 15 minutes were up, he was pounding a drill about up to his nipples. Yockey pulled his long drill out of the hole and imitated the man from Bodie. Another driller from Goldfield lost his hammer several times and jumped down off the platform and picked it up and went at it again. Yockey threw his hammer away, ran and got it, and continued on. Walter Bradshaw got second money and drilled 25 in. and a fraction. Yockey drilled 28⅞ in. and had he drilled first, he probably would have drilled 30 in., or thereabouts.

A few days afterwards he drilled at Goldfield on Railroad Day (the day the railroad arrived at Goldfield) and drilled 30 in.

I will state that the contests were drilled with round steel, but all steel had to measure ⅞ in. in the double-hand contests and ¾ in. in the single-hand contests.

Double-hand contests were drilled with 8-lb. hammers, the single-hand contests with 4-lb. hammers. All were weighed by the judges before the contests started. But only one team drilled at a time.

The largest purse ever drilled for was at Tonopah, Labor Day, 1905.

The double-hand purse was $1,000, plus the entrance fee of $12.50 per man. It was won by Ross and Bradshaw and they drilled 43 in. and a fraction. McIvor and Make got second money and were beaten a fraction of an inch.

Yockey got $587.50 for drilling 27⅞ in.

The deepest hole that I have any record of was drilled by Pickens and McIvor at Spokane, Washington. Something over 50 in.

Fred Yockey and Hugh Johnston drilled a hole about that deep a few years later at Spokane, but they drilled through the rock and another team was declared the winners. Yockey got first in the single-hand.

There were about 10 of those big fellows who had a real cinche on the drilling contests. Chamberlain and Make both weighed 220 lb. Ross weighed 210 lb. McNichols was larger.

Pickens weighed about 240 lb. Page was a little over 200.

Bradshaw weighed 200 lb. McIvor was the smallest of the lot and weighed 176 lb. at Tonopah. However, he was a man built like Bob Fitzsimmons. Great shoulders, as beautiful a pair of arms as any man ever had. Lots of heart and lung capacity. I believe that he was the peer of any man that ever picked up a hammer.

Yockey was very careful about his diet, but he never took his pipe out of his mouth, only to refill it. I am wondering how he ever got it back into his mouth past the chew of Horseshoe which was always there.

My brother married his widow a short time after Fred died. I have his hammer and I looked it over yesterday. I can see no trademark on it whatsoever. I am of the opinion that some blacksmith made it for him. I have never seen any on the market like it. It is 7 in. long and bow-shaped, square at the eye and octagonal from there out. He always had two or three of them and since they never seemed to be on the market, I believe he had them made. He gave me one at Tonopah with which I won every contest I drilled in thereafter.

Will state that I wrote several articles for the *Journal* in 1916 and 1917 on shaft timbering, so this is not my first to you.

If you consider this worth printing and could use it, I have a splendid picture of Yockey which was printed in the papers of the West at the time he was at his best.

Your clipping states that he was never beaten. He was beaten the second time he drilled by a Cousin Jack named Roberts in one of the San Juan towns. He had not at that time got to sharpening his own steel and had two broken drills. Luke Page beat him at Phoenix, Arizona, but he had slowed down 3 or 4 in. from what he was at his best.

ATHA ALBERT RICHIE

Rilato, California

TO THE EDITOR

Engineering & Mining Journal

I received your nice letter accepting my piece concerning the drilling records.

You asked me to write a short piece about myself, and asking for my best

(Continued on page 121)

MUSONOI OPEN-CUT MINE, here seen, is now one of Union Minière's foremost mines. In 1950 it furnished more than 35% of the company's total ore production. This deposit carries copper and cobalt.

Katanga's Mineral Empire

Great enterprise of Central Africa yields copper, zinc, cobalt, cadmium, gold, and silver. Operations comprise open-pit and underground mining, concentration, smelting and electrowinning.

EDGAR B. SENGIER
Chairman, Executive Committee
Union Minière du Haut Katanga
Brussels, Belgium

TABLE I. Katanga's Metal Production 1911-1950

Year	Copper Metric Tons	Tin Metric Tons	Cobalt Metric Tons	Zinc Concentrates Metric Tons	Cadmium Kg.	Silver Kg.	Gold Kg.
1911	998						
1918	20,238						
1920	18,962						
1925	90,104		126				
1930	138,949		849				
1935	107,682	773	177			117,000	520
1940	148,804	1,120	1,012	21,115		70,200	87
1941	162,167	890	1,255	28,600	29,958	110,350	202
1942	165,940	1,160	1,934	16,649		117,200	139
1943	156,850	1,190	2,009	40,872	23,161	96,600	76
1944	165,484	1,270	1,818	31,030	21,577	81,150	30
1945	160,211	1,067	2,805	47,439	18,198	112,423	7
1946	143,885	514	2,156	67,024	15,477	96,650	8
1947	150,840		3,590	77,860	26,000	148,763	10.6
1948	155,515		4,351	87,173	18,000	118,371	74
1949	141,399		4,403	109,263	24,635	149,343	44.5
1950	175,920		5,148	146,753	29,668	138,720	43.3

SINCE THE PUBLICATION of an article in Engineering and Mining Journal in 1930[1] describing the operations of Union Minière du Haut Katanga, in the Belgian Congo, the Union Minière has greatly developed and diversified its production of metals, as shown in Table 1. In the present article the practices currently employed in our mines, mills and metallurgical plants will be briefly explained.

The orebodies now being worked are in a sedimentary complex that is probably of pre-Cambrian age. Originally it was dolomitic in character. It has been much disturbed.

[1] The former article (*E&MJ*, Nov. 24, 1930) dealt with the industrial development that had been achieved in the 20 years preceding publication. It also described the social improvements made possible for the benefit of the native workers and the new projects the company had in hand. Many of the difficulties that had once seemed insurmountable had already been overcome.

OLDEST OF WESTERN GROUP, Kolwezi mine accounts for about 10% of Katanga's annual ore output. Overburden and ore are handled by heavy-duty trucks. At present, the oxidized ores come mainly from this group.

Based on Many Metals

The deposits are spread over a considerable extent.

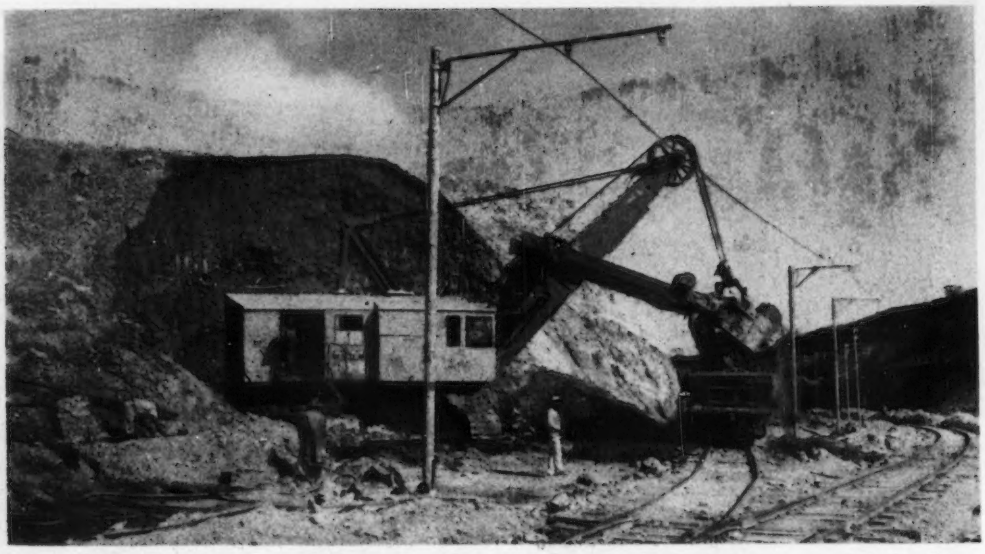
At depth, the deposits present themselves as bedded sulphides, and carry copper and cobalt with a little precious metal (gold and platinum group). Among others there is a vein deposit of the classical type of copper-zinc-lead, with silver and cadmium. Certain deposits have been recognized on exploration at a depth of several hundred meters.

The nature of the enclosing rocks, together with the climatic conditions, has brought about an intense superficial alteration which has modified the original character of the mineralization in the upper part of the deposits. This is accompanied by some enrichment and a modification of the mineralization. The gangue loses its dolomitic character completely and the mineralization consists of various oxidized compounds, among them malachite and chrysocolla.

The modifications, due to the superficial alteration and the nature of the minerals which result from it, depend essentially on the varying original nature of the diverse layers making up the mineralized complex. The details of these sedi-

TABLE 2. Production of Katanga's Open-Pit Mines 1921-1950

Year	Ore Metric Tons	Waste Metric Tons	Total	Year	Ore Metric Tons	Waste Metric Tons	Total
1921	712,100	684,400	1,396,600	1936	395,300	691,000	1,086,300
1922	1,014,500	576,200	1,590,700	1937	996,500	1,197,500	2,194,000
1923	1,305,600	730,700	2,036,300	1938	1,133,300	2,207,700	3,340,900
1924	1,560,900	531,600	2,092,500	1939	1,195,700	1,804,600	3,000,300
1925	1,844,600	446,900	2,291,500	1940	1,298,000	1,769,700	3,067,700
1926	1,286,600	1,306,300	2,592,900	1941	1,358,900	1,945,600	3,304,500
1927	1,575,100	1,978,500	3,553,600	1942	1,782,600	1,783,000	3,565,600
1928	1,719,000	2,792,200	4,511,200	1943	1,866,200	2,046,100	3,912,300
1929	2,073,700	1,970,200	4,043,900	1944	2,019,500	3,291,100	5,310,600
1930	2,360,800	2,253,000	4,613,800	1945	2,334,800	4,275,300	6,610,100
1931	1,043,800	1,806,700	2,850,500	1946	1,286,400	5,780,000	7,066,400
1932	473,000	668,600	1,141,600	1947	1,316,900	6,853,200	8,172,100
1933	431,800	742,600	1,174,400	1948	1,843,600	5,985,600	7,829,200
1934	663,500	991,400	1,654,900	1949	2,436,400	6,294,600	8,731,000
1935	578,900	495,400	1,074,300	1950	3,609,900	7,150,000	10,759,000



RUWE MINE, a new producer, contributed 34.6% of total in 1950. The greater part of the deposit occurs at depth. Pit is completely electrified, equipment including 6½-cu. yd. shovels and electric locomotives.

mentary formations are complicated.

All in all, the scattered occurrence of the deposits and the great variety of the minerals are the essential characteristics of Union Minière's mining domain. They still demand great flexibility, both in the mining practice and in the metallurgy employed.

The Open-Pit Copper Mines

The company's earliest mines were opened in the accessible oxidized deposits. These are still the most important source of ore for the plants (see Table 2). At the outset, these plants were supplied by the southern mines (L'Etoile, or Star mine, and Ruashi), subsequently by the Centre mines (in Kambove). The properties named are almost exhausted. At present, the oxidized ores come principally from the concession's Western Group, namely, Kolwezi, Musonoi, and Ruwe. The balance comes from some smaller mines to the east (Lukuni, Luiswishi).

Need for economizing on scarce labor and the desire to increase output caused the Union's mining department to push the mechanization and electrification of operations. To this end the most important mines, Musonoi, Kolwezi and Ruwe, were equipped as quickly as possible.

In 1950 the Musonoi mine furnished more than a third of the company's ore production. This deposit carries copper and cobalt, which are recovered selectively. The mine itself is well equipped with shovels and trucks. Overburden is being removed with railroad cars.

The Kolwezi mine, the oldest of the Western Group, still furnishes about 10% of the total output of ore. Mining has reached the lower levels. Trucks are used for both overburden and ore.

A new producer, the Ruwe mine, can be depended on to furnish the plants with 6% of the total output of the mines (1950). Most of the ore in this mine is rather deeply buried. Before it could be opened, 12,500,000 cu. yd. of overburden had to be removed. The Ruwe mine is entirely electrified. Loading is done with 6.5-cu. yd. shovels into railroad cars hauled by electric locomotives.

The Western Group of mines has a program calling for moving 9-million to 10-million cu. yd. per year. All are equipped with the necessary machinery. This includes:

Fifteen electric shovels of 3 to 6.5 cu. yd. dipper capacity, taking 2,200 volts. Also several electric shovels taking 550 volts, or smaller ones equipped with diesel motors.

Twenty rock-drills taking 550 volts.

Twelve 70-ton electric dc, 600-volt locomotives, and some 35-ton steam locomotives.

One hundred 12 or 16-cu. yd. dump cars.

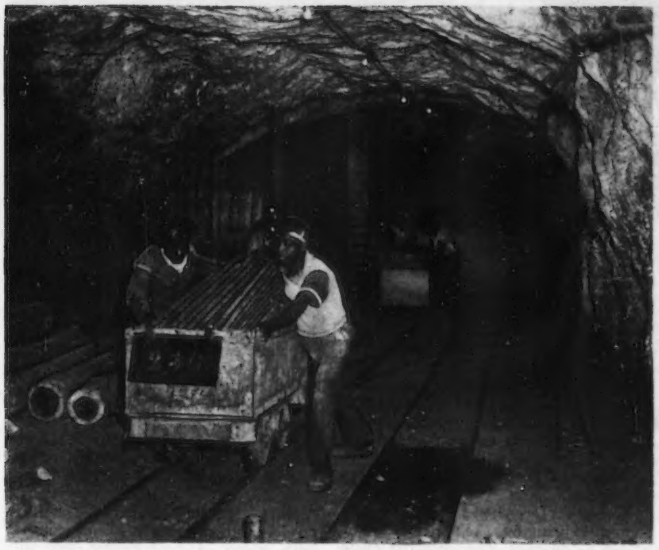
Fifty 22-ton heavy-duty trucks with accessory equipment, such as road patrols, bulldozers, sprinklers and water units, automobile cranes and 10-ton service trucks.

Where the track is electrified, the dc is supplied by mercury-arc converter stations, some of which are portable. Half of the electric locomotives are fitted with auxiliary diesel engines and can operate on the non-electrified tracks.

The Luiswishi, Lukuni and Shituru mines, of less importance, supply the balance of the oxidized ore. Mining methods are used that are sufficient for the smaller tonnages extracted.

TABLE 3. Performance of Native Labor in Surface Mines

Year	Tons Produced Per Man-Year
1942	771
1943	657
1944	846
1945	1225
1946	1663
1947	2148
1948	2214
1949	2663
1950 (estimated)	3046



UNDERGROUND in Prince Leopold mine. Top-slicing is the stoping method used. Cars coming off cage carry carbide-tipped forged steel, used for drilling.

The mechanization of our surface operations, which has progressed much since the war, has permitted a great saving in native manual labor. Table 3 gives the output per man-year.

To appreciate the value of these results, one should bear in mind that a quarter of our labor was completely unfamiliar with our technical civilization until a little more than three years ago. This labor has had to be broken in to handle even the most simple piece of equipment.

The Underground Mines

The deposit of the Prince Leopold mine in Kipushi was worked from surface at first and then underground from 1925 on, for oxidized ore. Subsequently, an underlying vein of exceptional richness in copper and zinc sulphides has been worked. The mineralized zone does not follow the stratification. It consists of calcareous breccia and calcareous schist filling a long transverse fissure. The vein is 98 ft. thick on the average and 2,420 ft. long. The dip is 70 deg. The extent of the deposit below 1,640 ft. depth is not known with any precision as yet. The Prince Leopold mine will assure the sulphide supply of our Lubumbashi smelter for several years to come. It produces about 700,000 metric tons of ore per year.

The underground workings of the Prince Leopold mine are served by four shafts:

One hoisting shaft, equipped with 5 metric-ton bottom-dump skips and an electric hoist with bi-cylindro-conical drum. This shaft serves also as an air-intake shaft.

One service shaft with a cage and counterweight. The single deck holds 45 men. The hoist is electric-driven, likewise with a bi-cylindro-conical drum.

One exhaust shaft, at some distance from the workings. This is equipped with the Koepe system of hoisting. The electric hoist handles a cage and counterweight.

One return-air shaft, with two electric fans on the surface, each of 200,000 cfm.

The richness of the Kipushi deposit required a mining method that would assure the complete recovery of the ore. The square-set method originally adopted was replaced later by top-slicing. This is more flexible, more economical and better suited to the native labor. It requires less attention and is less dangerous. This change has doubled the performance of the native labor. As the development of native miners progressed, the number of Europeans needed for the work at depth has decreased. The figures in Table 4 compare the performance, in kilos, of the native and the European miners.

TABLE 4. Performance in Underground Mining—Kilos

Year	Native Labor	European Labor	Ratio Native / European
1930	592	6,517	11.0
1931	634	8,373	13.2
1932	863	12,917	15.0
1933	1,038	24,423	23.6
1934	1,317	35,327	26.8
1935	1,423	43,485	30.5
1936	1,385	45,494	32.8
1937	1,308	44,216	33.9
1938	1,246	42,037	33.8
1939	1,683	55,988	33.2
1940	1,653	51,193	31.0
1941	1,909	72,067	37.8
1942	1,650	65,476	39.6
1943	1,442	51,261	35.6
1944	1,385	53,772	38.8
1945	1,517	49,694	32.8
1946	1,437	44,021	30.7
1947	1,269	40,058	31.5
1948	1,247	44,131	35.4
1949	1,343	48,348	36.0

The circumstances of the war seriously impeded the renewal and training of labor required for the Kipushi development. This is the explanation of the drop in performance toward the end of the war and in the postwar years. But the difficulties have now been overcome; the lost ground is being regained at an accelerated rate.

In respect to operation, we would point out that tungsten-carbide-tipped steel, with the bit integral with the rod, is used exclusively in driving development openings. This steel, in spite of its rather high price, affords the following advantages:

Greater speed of advance.

Reduction of number of bits used (250 times less).

Fewer changes, requiring less handling.

Longer life.

The long-range production program set up for the Lubumbashi smelter will necessitate, after the sulphide ores are exhausted (about 1954-55), the opening of a new underground mine, Kambove West. Preparatory work has already started.

Part 2 of this article will appear in the December issue. In it Mr. Sengier will discuss Union Minière's mineral dressing and metallurgical practice, as well as the company's industrial and social accomplishments.

KEEPING TAB ON PRACTICE

Bureau Approves Diesel Locomotive. Adoption of diesel locomotives underground has been making slow progress in the United States, in contrast to wide use abroad. Non-coal operators employing this and other diesel-driven equipment below surface, or contemplating such use, will be interested to note that the Bureau of Mines has given approval for the first time to a locomotive model submitted by a manufacturer. This is a 10-ton unit developed by National Mine Service Co., Pittsburgh, and now in service in a West Virginia coal mine.

The approved locomotive is powered by a 100-hp. 4-cycle Hercules diesel engine of the solid-injection compression-ignition type. The unit is designed to do 10 mph at full load.

Engine power is applied through a Twin Disc hydraulic torque converter, which provides starting-torque ratios up to 5.8:1.

Gordon MacVean, president of the manufacturing company (discussing the new locomotive in *Coal Age*, Oct., 1951, p. 100), says the locomotive's present use indicates that a factor of cohesion up to 34-35% may probably be used in computing available drawbar pull. This results from using the hydraulic torque converter between engine and wheels. Close control of output torque permits operation up to the slipping point of the wheels. While results are not yet conclusive, Mr. MacVean thinks that a diesel locomotive of this design may have greater haulage capacity than a trolley unit of like weight.

As to the exhaust gases, samples taken 10 in. in front of the radiator analyzed 0.009% CO, idling; 0.003% CO at partial load; and 0.004% CO at full load. The permissible limit is 0.10%.

Samples taken with throttle wide open and wheels stalled indicated 0.46% CO_2 against a permissible limit of 0.5%; 13 ppm NO_2 against a limit of 25; and 2 ppm of aldehydes against a limit of 10.

Diesel Locomotives Used in Tunnel Work. Diesel haulage has played a part in driving the 8-ft.-dia. pressure tunnel of U. S. Bureau of Reclamation's Carter Lake project in Colorado. In starting this tunnel a year ago, the contractor, K. S. Mittry Construction Co., had a 6-ton Plymouth gasoline locomotive for outside work and two 9-ton battery locomotives in the tunnel. Advance up to the 1,822-ft. point averaged 24.7 ft. per 24-hour day. Here, a 5-ton Ruth diesel locomotive was installed in the heading, air velocity being 7,500 cfm. Engineers of the Bureau and the State Commissioner of Mines approved the use of this unit, with its exhaust gas conditioner. Air tests with the locomotive in operation showed the mine air to be normal.

The diesel locomotive was not heavy enough to bring out the entire round of fifteen 6-ton cars. The mucking cycle consisted of feeding seven cars to the mucking machine, using the Utah Construction type of car pass, taking these to the portal, returning with seven empties and feeding them to the mucker. When the last car was loaded, the locomotive with the train of seven cars hooked onto the mucker, took it to a siding where the diesel motor pushed it into the clear. To do this, it had to push the seven loaded cars up the 2.2% grade, spot the mucker on the side track, and take the cars to the portal.

What the locomotive lacked in weight, it made up in speed. With its 80-hp. engine, it could accelerate 2 mi. per hour per second. Having approximately 16 rated horsepower per ton of weight, it fed cars to the loader faster than the 9-ton battery motor. The round was mucked in 45 to 90 minutes, including a round trip to the portal. In 24 hours, six and sometimes seven rounds were put in.

Under these conditions, the 5-ton diesel locomotive alone was used in mucking the rounds for the next 1,121 ft. It averaged 27.3 ft. per day against 24.7 ft. for the 9-ton battery motor.

At this point the Plymouth gasoline locomotive was converted to diesel power and equipped with a Ruth exhaust gas conditioner. Like the other diesel unit, it was approved by the Bureau and the Commissioner before being installed. The union's business representative followed the operation closely, making inspection trips into the heading from time to time. At no time was there complaint from workmen or union, with both locomotives in operation.

From then on, both locomotives averaged 37.8 ft. per day for the next 2,389 ft. It was possible to bring out the entire round in one trip, each locomotive handling seven or eight cars.

No objectionable odor was noticed, despite the exhaust and the fact that there is only 5,000 cu. ft. of air from the blowers at the 5,300-ft. breast. Tests showed mine air was normal.

The 5-ton diesel locomotive was used initially where the ground required steel sets, which take time to place. Where the second diesel locomotive was added, the rock section did not require steel sets. This, in part, is responsible for the better speed made.

Dry Diamond Drilling for Diamonds. De Beers Consolidated Mines, Ltd., Kimberly, South Africa, at its blue-ground diamond pipes has developed a procedure for drilling long blast holes by diamond drills after extensive experiment. This has become standard practice. Certain initial difficulties had to be overcome. In normal drilling, water is used as a sludging medium to remove the rock particles and to keep the diamond-drill crown cool. In Kimberly mines, use of water for this purpose is not possible.

Blue ground characteristically swells and disintegrates on contact with water. A hole drilled wet will close up again before it can be blasted. Another difficulty with water is that it forms a glutinous mud with the blue ground, which is most difficult to handle and closes while drilling. In addition, the presence of water in the blue ground causes the roof to break away and the floor to lift. Accordingly, compressed air has to be used as a sludging medium.

The following brief description of the drilling technique, issued by Anglo American Corporation of South Africa, is confined purely to the crowns and the dust catching, as the rest of the procedure follows normal lines.

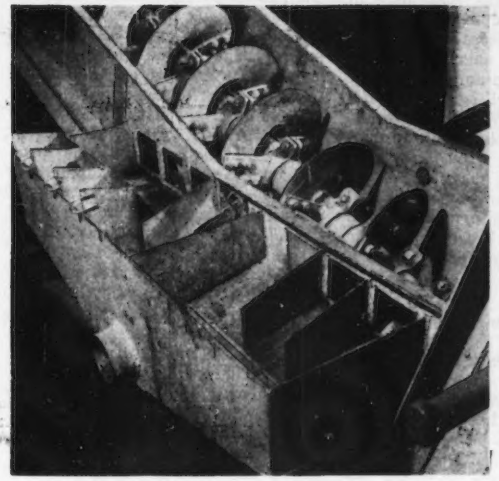
(a) Crowns. The drilling crowns used are supplied by Boart Products (S.A.), Ltd., a member of the Anglo American group of companies. They were evolved especially to meet the conditions at Kimberly.

The crown consists of inserts which have been brazed into a steel head, copper being used for the brazing, so as to withstand the higher temperature. The inserts consist of tungsten carbide, which has been impregnated with small diamonds, the whole being cemented together by means of cobalt.

The average footage drilled by these crowns is about 400, and the cost per foot drilled about 7d.

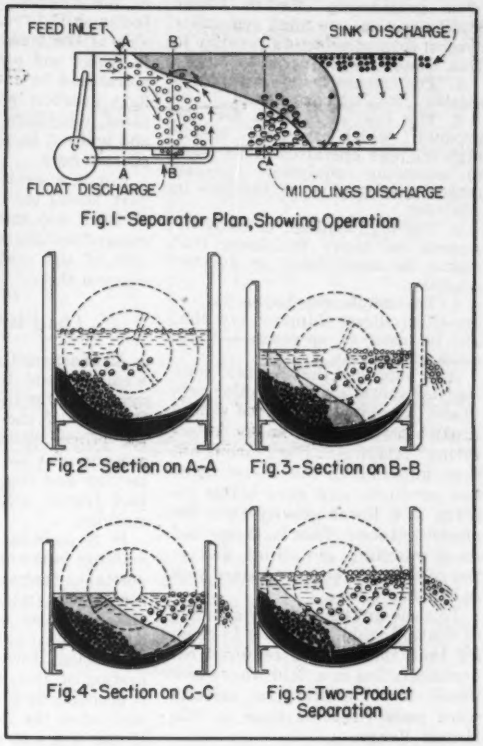
(b) Dust-Catching. The dust from the collar is sucked away by a compressed-air fan and passed through a large wooden box containing filter beds of wood shavings which catch the coarse dust. From here the air is blown through a long cylindrical flannel bag made of fine-weave flannel; this filters out the fine dust.

Further experimental work is continually in progress to improve the efficiency and lower the cost. In current experiments emphasis is again being given to improved crown design and dust-catching.



SEPARATOR used for tests has adjustable ports for product control. Farthest are for middling; nearest for float.

Why did an Akins HMS separator handle an iron ore middling, but fail on a zinc ore? This study of control of sink and float middlings provides an interesting answer.



ACTION, producing middlings, is shown by sections of separator. Zones of differential density are shaded.

Finding A Way To Handle The HMS Middlings Problem

E. C. BITZER,
Colorado Iron Works Co.,
Denver, Colo.

FOR MANY APPLICATIONS of the Heavy Media Separation process, a two-product separation is satisfactory, but there are also applications where the ability of a single separatory vessel to remove a middling product for separate treatment or sale is of interest. Such a three-product separation may achieve cost economies and easier plant operation.

This article describes a series of tests run to define the ability of the Akins HMS separator to produce a true middling product, and to determine the factors of control in so doing. That the separator could produce a middling was learned early in the development of the machine. Success in handling iron ore, however, followed by a failure in treating a zinc ore, led to the investigation described here. Incidentally, the results confirm most of the basic concepts of the separator's action, although they were based heretofore largely on deduction. The way is pointed to further refinements in design and operation.

The idea of using a conventional Akins classifier as an HMS separatory vessel was first tried out on the Mesabi Range. It was hoped to cut power consumption and simplify operating procedure by using the Akins spiral to remove sink product instead of the relatively inefficient and high-cost air lift on the cones then operating. This hope was quickly confirmed in actual operation.[1]

Early HMS Work

However, an additional, and completely unexpected, advantage of the new separating vessel was that it gave metallurgcial results superior to the cone. The closed-top cones then used, by providing an increasing rising velocity of medium toward the top of the cone, aimed at rejecting any heavy high-silica middlings. In this they were partially successful, but recovery of fine-sized ore was poor.

[1] E. C. Bitzer: A New Separating Vessel for Sink-Float Concentration, AIME Tech. Pub. 2182, May, 1947.

HMS Middlings Problem (*Continued*)

In considering Mesabi Range HMS practice, one must remember several economic factors peculiar to Iron Country operations:

1. The necessity of making a salable low-silica concentrate.
2. The low unit price for the product, which requires steady high-tonnage operation. This leads to crowding equipment beyond rated capacity at some sacrifice in efficiency.
3. The high content, in many instances, of heavy middlings that cannot be beneficiated by further crushing.
4. The ample supply, as yet, of low-silica direct-shipping ore that can be used to up-grade a high-silica concentrate.

It so happened that the first commercial operation of an Akins separator was on a crude feed with a fairly high content of heavy "interfering" middlings. For reasons not then understood, the vessel made two products, and gave better results, at a lower gravity than the closed-top cone. That is, it rejected more middling as tailing, and at the same time recovered more sink in the fine sizes.

To clear up this seeming anomaly of floating middling higher in gravity than the medium required experimentation in a field where economic and metallurgical criteria were more exacting than on the Mesabi Range.

Three-Product Separation

Two-product separation with the new vessel on iron ore was very gratifying, but the first attempt to concentrate a low-grade zinc ore in the same way was a complete failure. Much of the mineral occurred as a light middling that reported with the float irrespective of the gravity of the medium. The idealized sections of the separating pool show what happened and indicate the remedy.

Fig. 1 is a plan view of one type of Akins separator designed for separations at gravities higher than 2.60.

Fig. 2 shows that at a foot or so forward of the feed point, most of the float is on the surface; the bulk of the middlings has gone into teeter; some float and middlings are entrained in the settled bed of sink material. Medium gravity is uniform here.

Fig. 3 shows the section where float and middlings are beginning to leave the bed of sink owing to entry into a zone of gravity differential in the medium (indicated by shaded area in Fig. 1) set up by the rotation of the spiral and settling of the medium. The middlings in teeter shift toward the low-gravity side of the pool. Here they remain in teeter and are advanced by the spiral and by medium flow. If the float overflow port is properly located, middlings will pass below it and will not be picked up by upcast current here.

Fig. 4, a section at the middlings port, shows the bed of sink cleared of float and middlings. The main mass of middlings is crowded to one side of the shallow pool and discharged there.

Load Is Important

As mentioned, these diagrams are idealized, and to some extent exaggerated for illustrative purposes. Removal of the three products at the proper points depends on the amount of sink load the spiral is moving and the rate at which the load travels along the bed of the machine.

It is obvious that any float remaining in the sink at the point opposite the float overflow (Fig. 2) will report with middling as misplaced material. Also, an excessive spiral speed will result in an inefficient separation. However, the initial separation of sink, float, and middling is probably 90% complete a few seconds after the feed enters the pool. If the size and operating speed of the vessel are properly selected, a separation of high efficiency can be made.

Fig. 5 illustrates the mechanics of a separation into sink and float products only, with heavy middlings reporting with light float material. This is the condition that was attained in the first work with Mesabi ore, already mentioned. The float and middling are separated from the sink, but with the middling outlet non-existent, there is no place for the middling to escape except with the float. The specific gravity at the shallow end of the separating pool is high enough to keep middling in teeter. When enough of the material has accumulated in the pool, it is simply crowded out.

The efficiency of this separation probably suffers by being dependent on a heavy load of sink product. The probability of middling being rejected as sink products is, therefore, improved with fluctuations in the amount of sink. Nevertheless, this mode of operation gave excellent results in the early work because Mesabi ores have a high percentage of sink constituent. Also, for reasons already mentioned, the equipment is generally crowded to the peak capacity and beyond it.

The necessity of removing intermediate gravity material as a separate product was first demonstrated in work with a lead-zinc ore in which most of the zinc occurred as a middling constituent. Subsequent work on garnet ore with a high middling content was projected into successful commercial operation. Descriptions of these early investigations have been published.[1,2] Data are incomplete in many respects because all of the work was done in operating plants where the exact gravimetric structure of the raw feed was unknown and the conditions of the tests were often dictated by operating requirements. The work to be described here investigated some of the operating variables and controls on a small Akins separator of the most recent design and on a feed with a known and fixed middling content. This was a Mesabi ore with a fairly high proportion of heavy middling that made a sharp separation by conventional methods hard to attain.

Equipment Used

A small Heavy Media circuit designed for continuous operation was arranged for the tests. It consisted of a 12-in. Akins separator identical to that illustrated in the photograph, a medium circulation pump, and a single-deck drainage and washing screen with ⅛-in. openings, divided into three compartments by division strips lengthwise of the deck. A small medium recovery circuit was included which consisted of a small drum-type magnetic separator, a laboratory size densifier, and a demagnetizing coil for the densified medium. A vertical solids-handling pump was used to close the circuit between the wash hopper under the screen and the medium recovery circuit.

A commercial grade of 48-mesh ferrosilicon was used for the tests. The circuit was charged with fresh material and a small amount of iron ore slimes was added to give initial stability to the medium. The screen analyses of medium at the various discharge points as well as that of the circulating medium are given in Table I.

Crude Ore

A sample of crude ore, weighing about 4,500 lb. was screened through 1 in. and on 3/16-in. The minus 3/16-in. fraction was discarded and the 1 in. oversize was crushed

[2] H. H. Vogel and E. C. Bitzer: Shift to New Separator Cuts Garnet Milling Costs, *E&MJ*, Aug., 1949.

Table I—Structure of Ferrosilicon Medium Used In Tests, % Weights

Mesh	Circulating	Sink	Middling	Float
On..... 48	3.21	5.18	3.84	2.75
On..... 65	12.42	16.33	12.69	9.91
On.....100	22.65	26.10	23.71	21.10
On.....150	18.04	18.53	17.86	18.17
On.....200	13.83	11.55	13.36	14.31
On.....270	4.21	3.78	4.17	4.59
On.....325	2.40	2.39	2.67	2.39
Minus.....325	23.24	16.14	21.70	26.78

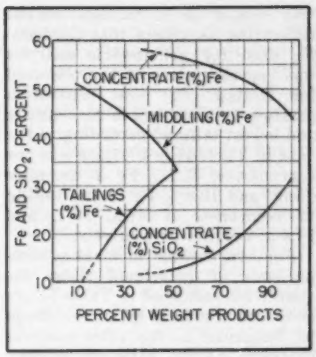


Table II—Gravimetric Structure of Crude Iron Ore For Tests (See Curves Above)

Product	%Wt.	%Fe.	%SiO_2	%Wt.	%Fe.	%SiO_2	%Wt.	%Fe.	%SiO_2	%Wt.	%Fe.	%SiO_2
Sink.....3.30	47.46	57.60	12.33	47.46	57.60	12.33						
					Concentrate							
Sink.....3.20	9.54	50.68	22.18	57.00	56.44	13.95	9.54	50.68	22.18	52.54	33.26	49.00
Sink.....3.10	5.14	48.91	26.02	62.14	55.82	14.90	14.68	50.06	23.50	43.00	29.50	55.00
Sink.....3.00	4.15	44.09	33.03	66.29	55.08	16.10	18.83	48.74	25.60	37.86	27.20	58.90
Sink.....2.90	6.63	40.22	38.84	72.92	53.73	18.20	25.46	46.52	28.20	33.71	24.61	61.85
Sink.....2.80	2.56	35.56	45.14	75.48	53.12	19.10	28.02	45.52	30.60	27.08	20.79	63.90
Sink.....2.70	6.17	32.02	51.36	81.65	51.52	21.50	34.19	43.09	34.30	24.52	19.25	69.60
Sink.....2.60	1.93	24.46	61.52	83.58	50.90	22.40	36.12	42.09	35.70	18.35	14.96	76.00
								Middling				
Float 2.60	16.42	13.84	77.58	100.0	44.52	31.52				16.42	13.84	77.58
											Tailing	

Table III—Complete Results of Tests To Study Middlings Control

Test No.	Feed lb./hr.	Sp. Gr. Circ.	Ports Midds.	Ports Float	Feed %Wt.	Feed %Fe.	Feed %SiO_2	Concentrate %Wt.	Concentrate %Fe.	Concentrate %SiO_2	Middling %Wt.	Middling %Fe.	Middling %SiO_2	Tailing %Wt.	Tailing %Fe.	Tailing %SiO_2
8.....1580	3.03	none	5–7	100.0	42.36	34.68	56.9	56.62	13.88	....	.....	.....	43.1	24.03	62.02
9.....1910	2.71	1–2–3	5–7	100.0	44.57	31.86	48.0	57.76	11.74	38.5	36.52	44.28	13.5	12.39	80.22
10.....1810	2.73	1–2–3	4–7	100.0	43.44	33.28	48.6	56.48	13.63	38.2	35.08	46.57	13.2	11.91	80.12
12..... 954	2.82	1–2–3	4–7	100.0	45.11	30.66	49.2	55.78[1]	14.60[1]	34.8	37.51	42.37	16.0	13.42	77.57
14..... 950	2.88	1–2–3	4–7	100.0	44.63	31.12	45.2	56.76	13.01	38.8	40.59	37.70	16.0	16.33	70.77
16.....1450	3.02	1–2–3	4–7	100.0	44.95	31.10	50.4	56.93	13.33	32.4	38.97	39.64	17.2	20.86	65.11
19.....1622	2.69	1–2	3–4–7	100.0	43.76	33.06	48.5	58.89	10.30	25.7	44.89	31.60	25.8	20.59	66.51
20.....1866	2.69	1–2–3–4	5–6	100.0	43.44	33.10	45.8	57.60	12.59	33.8	38.29	40.77	20.4	16.89	72.47

[1] Check assays reported 57.77% Fe, 11.91% SiO_2.

through 1 in. and again screened on 3/16-in. The final sample, therefore, consisted of minus 1 in. plus 3/16-in. with some fines adhering from the dry screening operation. The final sample was thoroughly mixed and riffled into equal parts of approximately 2,000 lb.

A sample of about 15 lb. was taken from one of the split portions for specific gravity analysis. The gravimetric structure of the ore is shown in Table IV.

The calculated cumulative percentages indicate what the iron and silica contents of the various prod-

Table IV—Gravity Analysis of Products Test 12

Product	Fraction	%Wt.	%Fe.	%SiO_2	Calculated Total %Fe.	Calculated Total %SiO_2
Concentrate.....3.30 sink		97.58	58.42	10.92		
	3.30 float	2.42	31.78	51.64	57.77	11.91
Middling.....3.30 sink		18.62	52.48	19.54		
	3.20 sink	16.44	46.22	29.24		
	3.10 sink	15.87	41.25	37.34		
	3.00 sink	3.19	41.89	36.18		
	2.80 sink	20.83	36.59	43.53		
	2.80 float	25.05	19.58	68.06	37.76	41.57
Tailing.....2.80 sink		4.48	36.43	42.54		
	2.80 float	95.52	16.53	73.05	17.42	71.90

ucts should be at various weight recoveries, assuming that the sample used for gravimetric analysis was representative of the ore used for testing. The best separation possible (highest-grade concentrate and lowest tailing) according to the data in Table II is 57.6% Fe in the concentrate, 42.1% Fe in the middling, and 13.8% Fe in the tailing at recoveries of 47.5, 36.1, and 16.4% weights respectively.

For convenience in making comparisons of individual tests, the quantities indicated in Table II are shown in the form of curves, Page 93. Inasmuch as the silica assay is pertinent to the concentrate only, no curves are shown for silica contained in the middlings and tailings products.

Testing Procedure

In order to investigate the effect of variables of specific gravity, settings of overflow ports, spiral speed, feed rate, etc., it was necessary to save the products from each test, mix them as thoroughly as possible and re-use the mixture for subsequent tests. The practice, which was dictated by the limited amount of original sample, undoubtedly allowed room for error from test to test due to some uncertainty as to the thoroughness of mixing of the sample.

Most of the tests reported in Table III were from continuous runs of 15 to 20 minutes' duration. The sampling interval on these relatively short runs was five minutes. Test No. 20, in which it was felt that the various adjustments would give optimum results for a three-product separation, was of about an hour's duration and the sampling interval in this instance was 10 minutes.

The weight of samples cut for assay of gravimetric analysis was limited to between 5 and 10 lb. In view of the small amount of ore available for the tests, this limitation is understandable. It must be recognized, however, that the quantities cut were not in accordance with good practice for obtaining a representative sample of such coarse material.

This is one of the weaknesses and dangers of small-scale batch Heavy Media testing. In spite of the necessary shortcomings in sampling procedure, some very good checks were obtained on performance as compared to indicated theoretical results.

1. A variable speed drive was furnished with the machine, but it was found necessary to operate the 12-in. spiral at top speed of 20 rpm in order to get a satisfactory specific gravity differential in the pool with the coarse, quick-settling medium used. Speed was, therefore, not a controllable variable in this instance, but a comparison between the operating speed and pool residence of sink material in the 12-in. machine and a standard commercial size gives some idea of the extreme rapidity of the initial sink-float separation and subsequent cleaning of the concentrate as detailed in the explanations of Figs. 1 to 5 inclusive.

Spiral diam. ..	12 in.	78 in.
Spiral pitch ...	6 in.	39 in.
Normal rpm ..	20	7
Linear speed, in./min.	120	273
Length of travel, ft.	4.75	24
Residence time seconds	28.5	63.1

The residence time is calculated on the assumption that a particle of sink material will travel from the deep end of the separating pool to the point of emergence at the shore line with no slippage. There is some slippage but, whatever this may be, it is apparent that more time is available and a more complete separation will take place in a commercial size of machine than in the small one; also, that in large machines, spiral speed becomes a control factor.

2. The photograph shows seven overflow ports. Beginning at the shallow end of the pool, the first four are equipped with hinged launders. These, when dropped into the lower position, deliver the medium and product to the outer or float section of the overflow launder. When the launders are raised, the product drops into the inner or middling product section. For purposes of identification and tabulation of machine settings, these ports are numbered 1 to 4, inclusive, and are so noted in Table III. Ports 5 to 7, inclusive, are at the deep end of the pool and discharge the lightest float material to the outer section of the overflow launder only. The photograph shows ports 1, 2, and 3 set to discharge to middling and ports 4, 6, and 7 to float.

The only other adjustments in the operation of the separating vessel, are crude ore feed rate and specific gravity of separating medium. These require no further explanation.

Discussion of Tests

Test No. 8—Two Product Separation. The object of this test was to demonstrate the elimination of middling and float material as a combined float product. The specific gravity of the circulating medium was 3.03 and the specific gravity of the overflow medium was somewhat less than this. (There was not sufficient headroom for obtaining a reliable sample for gravity determination of either float or middling overflow medium in any of these tests.)

The assay recovery curve (p. 93), indicates that a concentrate containing about 56.4% Fe and 13.5% SiO_2 should be made on this ore at weight recovery of 56.9% sink. The results actually obtained—56.62% Fe and 13.88% SiO_2—is a very good check. By referring to Table II, it is apparent that the separation between sink and float was made close to a gravity of 3.20, although the medium carrying the float out of the separator probably had a gravity of around 2.90 with the gravity of circulating medium at 3.03. This is conclusive proof that the high specific gravity of medium in the shallow portion of the pool is the determining factor in the separation as illustrated in Fig. 5.

According to the assay recovery curve, the tailing at 43.1% weight should be 29.5% Fe. The actual assay from the test, 24.03% Fe, is not a good check. The most likely explanation of the discrepancy lies in the fact that the weight of sample taken was too small. Had the sample happened to include a few extra pieces of heavy middling, the iron content might have checked or even exceeded the theoretical assay.

Tests 9 to 16, inclusive—Effect of Medium Gravity. In this series of tests, the discharge ports were adjusted by visual inspection to get the best three-way separation. The specific gravity of the circulating medium was raised progressively to determine if the ratio between float and middling products could be changed in this manner. It will be noted that the recovery of sink product was substantially constant throughout and was at the grade desired, certainly within the limits of sampling error. No appreciable change in relative grades of float

and middling was apparent until a gravity of 3.02 was attained and even then, the difference was not great.

It may be concluded, then, that specific gravity of circulating medium is not a positive method of control.

Test 19—Effect of Port Adjustment. The results here illustrate that it is easier to take advantage of gravity differential in the pool by selection of overflow ports than to operate at a high gravity of circulating medium. In this instance, one of the ports that had been discharging to the middling section of the launder was diverted to the float section. The result was immediate and positive on both grade and recovery of the middling and float.

The principal object of this work was to make a separation of enough middling from the ore to determine if additional recovery could be obtained by finer crushing and additional treatment. For this reason, no further tests were made which involved adjustment of the port outlet.

Efficiency Of Separation

Test 20. This was the final test, the purpose of which was to make a final separation of the ore and produce enough middling for subsequent testing on this product only. A slightly different arrangement of ports was employed in this instance than in Tests 9 to 16, but no conclusions can be drawn as to the effect of this minor change. By this time the crude sample had been handled, mixed, and run through the circuit 20 times. In addition to the possibility of sampling error, the final structure of the ore was probably different from the original material upon which the gravimetric analysis has been made.

It may be asked if the results obtained in this work are fortuitous, or if the middling produced is not a mixture of sink and float products rather than a true middling. The fact that the average results obtained check very well with the indicated sink, float, and middling content of the original crude ore is in itself a refutation of this. To further check this point, however, the products of Test 12 were sampled and analyzed for specific gravity distribution, the results of which are shown in Table IV on page 93.

In view of sampling limitations, it would be idle to attempt to calculate the efficiency of this particular separation, but it is obviously very high. It should be noted that there is no true sink in the float or vice versa.

The constitution of the middling product in Table III also defies exact analysis due to inability to check at gravities higher than 3.30. It is apparent that the upper range of the product may contain a small amount of true sink with a small amount of true float in the lowest gravity fraction. That these amounts are small is supported by the fact that the actual recovery of sink and float products on this test is as close to theoretical as sampling error permits of any conclusion.

Conversely, it is apparent that an appreciable interchange, on a weight basis, of float in the middling and heavy middling in the sink could occur without changing the ultimate grade of either product appreciably. This fact has interesting implications from the standpoint of metallurgical control and grading of concentrate.

Many producers on the Mesabi sell their product on the basis of a guarantee of a certain maximum silica content. The ore in question is not a very good example. Assume, however, for purposes of illustration, that the 3.30 sink fraction (Table II) had an inherent silica content of 10.00% instead of 12.33% and that the purchaser was willing to accept a silica of 13.00%. The obvious and easiest adjustment to meet this requirement would be to divert enough of the 3.20 sink (middling) to concentrate to get the desired grade. This would involve only the mechanical operation of dropping a diversion chute in front of the proper middling port.

Two-Product vs. Three-Product

It is apparent from the data presented that substantially the same results were obtained (Test 8) by operating the vessel to reject middlings and float as a combined product. In many cases the middling in Mesabi ores consisted of refractory taconites for which there is at present no economical method of treatment. Hence, at present there would appear to be no valid reasons for making a middling as a separate product only to be obliged to combine it with lighter waste for final disposal. The product could, of course, be kept separate and stockpiled separately in contemplation of ultimate treatment when it is possible and economical to follow this course.

However, there are some attractive possibilities and possible economies to be realized by making a separate middling product, even though it may not be utilized immediately. The first, that of better control of concentrate grade, has already been mentioned in the preceding paragraph.

Another advantage is that the separation may be made at a low operating gravity, 2.70 as against 3.00 and higher. It would obviously require less power to circulate medium at the lower gravity. To counterbalance this advantage is the fact that more lighter gravity medium might have to be circulated, which would offset the power saving to some extent. However, since power required for medium circulation constitutes a great proportion of the total required for the process, there should be considerable incentive to investigate this possibility from the standpoint of power alone.

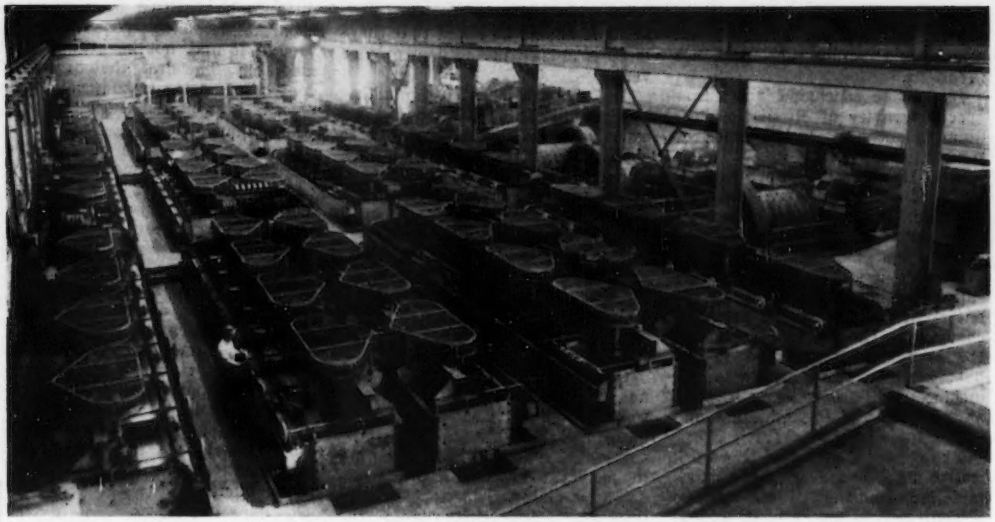
Low Viscosity Helps

Still another factor, and one not generally considered because little is known about it, is the fact that medium at the lower gravity would have less viscosity and would improve recovery of concentrate in the finer sizes. In present Mesabi practice, operating gravities in excess of 3.20 are not uncommon. When this is accompanied by large amounts of "painty" slime in the medium, the combination results in a pasty mixture of high viscosity. Examination of plant tailings has shown that the preponderance of recoverable iron loss in most cases is in the finer size fractions. This is due in considerable part to high operating gravities with resultant high viscosities.

Therefore, it appears that nothing would be lost by taking advantage of this refinement in operation because no extra equipment and no basic change in flowsheet is required to accomplish it. On the other hand are the possibilities of power saving and higher recoveries of concentrate.

In conclusion, it should be noted again that the successful use of the Akins separator on the two-product basis is limited to Mesabi HMS practice, or to ores such as one chromite operation[2] where no middlings are present. All other applications of the equipment require that the middlings be removed separately. Their disposition after removal is incidental to this requirement.

[2] A. P. Davidson: Post-war Rehabilitation and Mechanization of a Philippine Chromite Mine, *Mine Magazine*, December, 1950.



FLOTATION SECTION in new 10,000-ton Inco mill at Creighton uses six 24-cell banks of mechanical cells to make a bulk concentrate that is pumped 7½ mi. through an 8-in. line to Copper Cliff for nickel-copper separation.

Inco Tells What It Takes To Open Up A New Orebody

Here are details on the latest steps in International Nickel's 10-year expansion program, a new shaft and a new mill. Total cost will be $17-million

THE INTERNATIONAL NICKEL COMPANY OF CANADA, LTD., announces simultaneous completion of two projects involving total expenditures of $17-million—a new shaft and a new concentrator at its Creighton Mine in the Sudbury District of Northern Ontario.

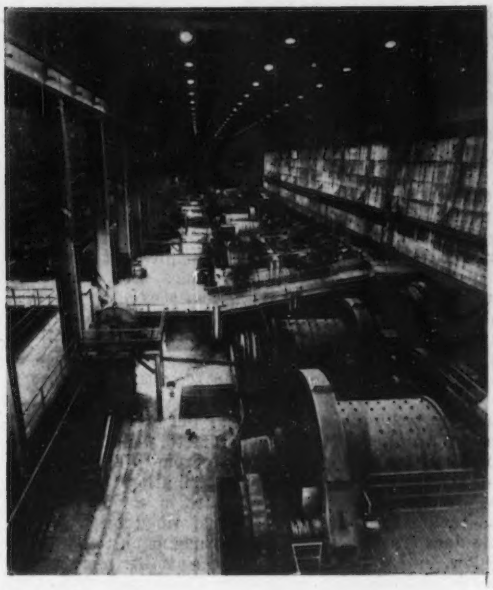
The new shaft brings to 13 the number of operating shafts in International Nickel's underground mines. The new mill, which concentrates ore before transportation to the smelter at Copper Cliff, has a capacity of 10,000 tons of ore a day. The additional underground ores will serve as replacement of open-pit ores and will enable the company to continue refined nickel production capacity at the present rate of about 250-million lb. per year. When designed in 1948, the mill was to have a daily capacity of 6,000 tons, but the company's plans were changed two weeks after the outbreak of hostilities in Korea to accommodate the additional tonnage.

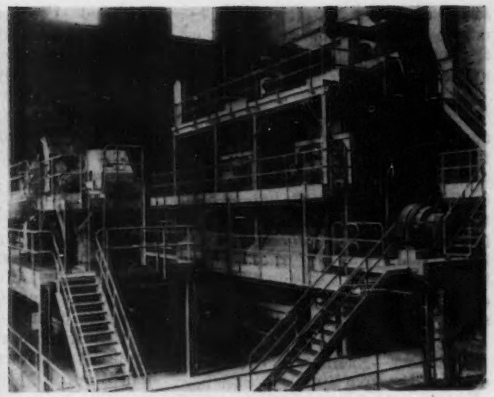
Completion of these projects represents a long stride toward achievement of a 10-year program of expansion in Inco's underground mining operations. It became apparent that the company would have to accelerate development of new underground sources of ore to replace its dwindling surface deposits, on which Allied nickel requirements in World War II were making such heavy demands. One of the first projects sent to the planning boards was a program for recovering at Creighton large blocks of lower-grade ore previously considered uneconomical for mining. Exhaustive research had shown that by using new bulk mining methods, and concentrating the ore on the spot to reduce transportation costs, recovery of the lower-grade ore was feasible.

New No. 7 Shaft—Sunk initially to a depth of 2,050 ft., the new No. 7 shaft at Creighton is the latest addition to a mining operation which has a proud record of production dating back to 1900. Designed for ore-hoisting only, it will handle ore recovered by the caving method. It is concrete-lined throughout and has two skip compartments separated by a manway and pipe compartment. This arrangement allows the hoist to be set up at a minimum distance from the shaft. The shaft is 8½ x 24 ft. in cross section.

Serving No. 7 shaft is a 14 ft. by 110 in. parallel double-drum geared hoist driven by two 2,750-hp. 600-volt 500-rpm dc motors with rotating-type control. The skips have a capacity of 15 tons each, and the hoisting ropes are 2-in. flattened strand with a breaking strain of 380,000 lb. Hoist operation is semi-automatic, with push-button control at the loading station. Hoisting capacity is 700 tons per hour.

The problem of mining ores from the leaner-grade sections at Creighton was complicated by the fact that richer-grade ores had





PRIMARY CRUSHING is done underground in new mine. This is surface secondary crushing plant in new Creighton concentrator. A scalping screen feeds two 7-ft. cones.

◀

GRINDING SECTION in new mill has four units, each with two 10 x 13-ft. mills, one as rod, other as ball. They run in series to make more efficient crushing-grinding units.

previously been removed from the area below the leaner-grade ores. Old mine openings interfered with an orderly arrangement of openings for the new program. This, and many problems in connection with the proposed caving program, were solved by using scale models and embodying the factors anticipated in actual underground mining.

Lower-grade ore now being mined at Creighton flows by gravity to 28 level of No. 3 shaft, where huge crushers with openings of 4 x 5½ ft. give it primary crushing. It is then dropped through a concrete-lined bin to 30 level. Here it is picked up by a conveyor and carried to an ore bin and loading station at No. 7 shaft, some 1,900 ft. distant.

Concentrator—The new 10,000-ton concentrator at Creighton is a remarkably compact, streamlined plant with many unusual features of design and operation. It is built at the site of No. 7 shaft. The headframe and hoist house are integral parts of the mill building. Ore from the mine is hoisted directly into the crushing plant. Part of the mill feed is nonmagnetic ore brought by conveyor from another Creighton shaft ⅔ mi. distant. The crushing plant has a simple straight-line flow sheet with no circulating loads. The grinding mills are among the largest in the world. The plant's water supply is obtained through a 6-mi. pipe line from the Vermilion River. The product, a bulk concentrate, is pumped through another line 7½ mi. to Inco's reduction plants at Copper Cliff. Sand removed from the flotation tailing is returned to the mine to be used as backfill.

Extensive laboratory, pilot plant, and operational scale test work preceded designing of the new Creighton concentrator in 1948. Capacity of the mill was originally set at 6,000 tons. Before construction was completed, however, changing world conditions made it essential that this be increased. Two weeks after the commencement of the Korean War, plans were altered to bring capacity up to 10,000 tons.

Constructed of steel, tile and concrete, the mill building's overall dimensions are 440 ft. long, 175 ft. wide, and 70 ft. high. It is laid out in three parallel sections: the bin aisle, 380 x 54 ft.; the crushing and grinding aisle, 440 x 60 ft.; the flotation aisle, 380 x 60 ft., containing reagent storage and feeders and also the classifiers of the sand fill plant. Attached to the southwest corner of the building is the hoist house, 116 ft. long, 65 ft. wide, and 58 ft. high. In the northwest corner, immediately adjoining the crushing plant and towering 196 ft. high, is the handsome monolithic concrete headframe of No. 7 shaft. Well-lighted and ventilated, the plant offers ideal working conditions.

Ore from No. 5 Shaft—Approximately one-quarter of the feed to the new mill is nonmagnetic ore which is transported direct from Creighton's No. 5 shaft rockhouse by a semi-enclosed system of three conveyors with a total length of 3,600 ft. The 30-in. 6-ply belt has a speed of 400 fpm and a rated capacity of 650 tons per hour. The second of two transfer points in the conveyor system contains a 150-ton surge bin equipped with variable speed feeders to control the rate of feed to the receiving belt at the mill. The ore from No. 5 shaft, 2-in. material, enters the mill circuit at the second stage of crushing.

Crushing—Ore from the caving operations in No. 7 shaft receives its primary crushing underground and is hoisted to a 700-ton dump pocket. Chain feeders deliver and control the rate of feed to two parallel crushing circuits. The ore passes on to a scalping screen. The oversize is reduced in two crushers set in series, a 7-ft. standard and 7-ft. heavy-duty short head. A screen eliminates the undersize ahead of the short head crusher. The feed flows by gravity through the plant, and no ore is circulated for recrushing. The crushing plant product is conveyed to the mill bins on a

42-in. conveyor 460 ft. long. This is separately housed and runs up the south side of the building at an angle of 15 deg.

Receiving Bin—The reinforced concrete mill bin is divided into four sections, each of 5,000-ton capacity. A four-way tripper, operating on a conveyor belt which runs the full length of the bin, prevents segregation of coarse and fines in distributing the feed to the four sections of the bin. The ore is weighed and automatically sampled before entering the bin.

Grinding—Each of the four units in the grinding aisle consists of two trunnion-type overflow mills and one rake-type classifier. One of the mills is charged with rods and the other with balls. Each mill, 10 ft. 8 in. in diameter and 13 ft. long, is powered by an 800-hp. synchronous motor and holds a 70-ton rod or ball charge. A present-day trend is reflected in this use of large-diameter rod mills to replace rolls as a final crusher.

The ore, drawn from the bin by variable-speed rollfeeders, is delivered to the rod mill of the grinding unit by means of a conveyor system. A scale automatically controls and registers the tonnage to the mill by regulating the speed of the roll feeders. Metered water to the grinding unit controls the grinding condition and, indirectly, the final size of the product. Crushed pulp from the rod mill, which uses rods up to 3½ in. in diameter, discharges into a sump. It is then pumped to the classifier, from which the rake sands flow by gravity to the ball mill. The comminuted product of the ball mill returns to the classifier. Overflow from the classifiers of the four grinding units is collected in a central sump and pumped to the flotation section of the plant.

Flotation—A bulk rougher concentrate ready for separation is produced by flotation. This is accomplished in 144 mechanical-type flotation cells arranged in six 24-cell banks. The flotation feed is delivered to a six-way distributor and then flows by gravity to each bank of cells. Flotation reagents are added to both the sumps and the cells, the feeders and head tanks being conveniently located on a floor overlooking the entire flotation circuit. Daylight has been eliminated and fluorescent lighting installed throughout. This improves conditions for visual observation of the flotation froth. The first 21 cells produce the bulk rougher concentrate; the product of the last three cells flows to a sump and returns to the flotation circuit as a control-circulating load.

The bulk concentrate is laundered into a sump from which it is pumped through an 8-in. wood stave line a distance of 7½ mi. to the Copper Cliff concentrator. Here it is separated into its final products of nickel or copper concentrates. There are five relay pumping stations in this unique operation.

Sand Plant—Flotation tailing is pumped to a three-way distributor which feeds three classifiers. The coarse fraction of the pulp, the rake sands, is piped directly underground to serve as backfill in the mine workings. The finer fraction, the classifier overflow, enters the final tailing sump. It is pumped through a 13-in. wood-stave line by way of three relay pumping stations to the tailing disposal area 4 mi. distant. The sand plant may be partially or completely bypassed, with the flotation tailing going directly to the disposal area.

Water Supply—Water supply for the new Creighton mill is pumped through a 20-in. continuous wood-stave line from the Vermilion River, approximately 6 mi. away. The pump installation at the river can deliver 3,500 gpm at a nominal pressure of 10 lb. Booster pumps at the mill raise the pressure to 60 lb. for process water. A chlorinating unit on the line makes the supply potable.

Dust Control—Dust from the primary and secondary vibrating screens and the crushers is piped by a system of ducts to a collecting unit. This consists of 20 standard 34-in. conical dust-collecting cyclones through which air is drawn at the rate of 62,000 cu. ft. per minute at 5-in. negative pressure. The dust is withdrawn from the bottom of the cyclones and pumped to the flotation circuit in the form of a sludge.

Changehouse—The mill changehouse, located on the second floor and reached by a ramp, has 130 steel two-compartment lockers. There are 15 individual showers in the tile-lined group shower room. The floor is covered with mastic. The lockers, lavatories, and shower room are serviced by a ventilation system which exhausts the air through the roof.

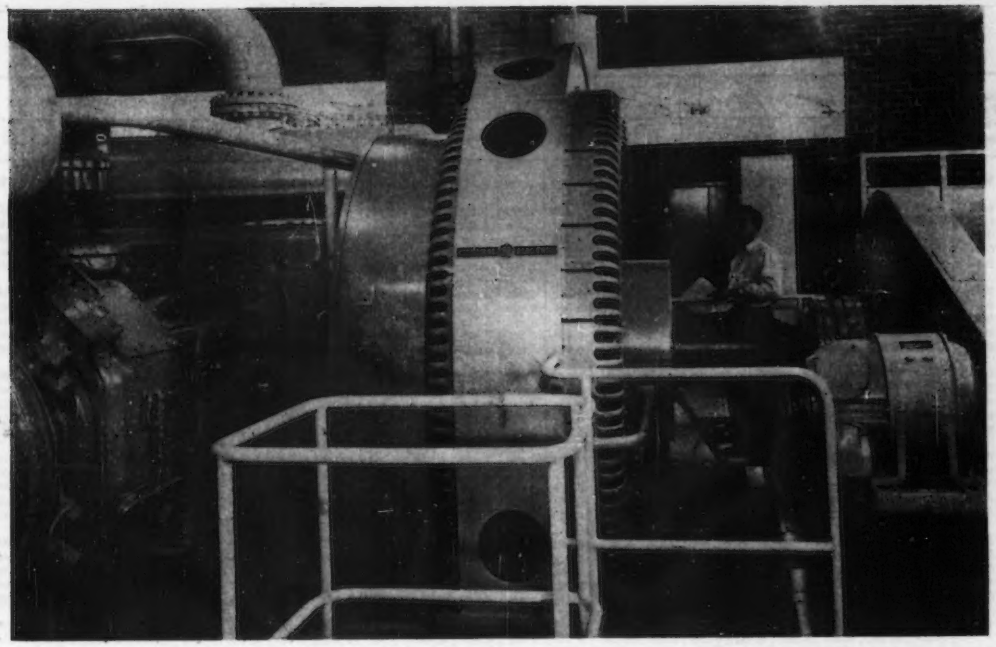
Samples and Assays—Total metal input to the mill is determined through automatic sampling of the feed by a line of two Vezin samplers followed by a roll crusher and a Snyder sampler. Samples of tailing are assayed every hour, samples of concentrate every two hours. Per cent-solids and sizing analyses of the various mill pulps are made regularly for operating control. The mill is equipped with a completely modern sample room and laboratory.

Electrical Service—Power for the 400-odd motors at the new mill is supplied from the Company's 60-cycle distribution system. Incoming power is at 44,000 volts and is transformed by a 15,000-kva transformer bank to 550 volts for use by the smaller motors. The motor control equipment is located centrally in switchrooms throughout the mill. Size of the motors varies from very small electric clock motors to the large 5,500-hp. synchronous motor driving the No. 7 shaft hoist.

The hoist proper is driven by two 2,750-hp. dc motors under amplidyne control. Two 2,000-kw. dc generators are direct-connected electrically to these motors and are driven by the 5,000-hp. synchronous ac motor. Amplidyne control permits operation of the hoist by push button from the loading pocket.

The 800-hp. synchronous ac motors driving the rod and ball mills are started across-the-line on full voltage.

Hoisting Capacity 13-Million Tons—As previously stated these two projects are part of International Nickel's extensive program of underground mine development. It was launched during World War II in anticipation of the depletion of the company's open-pit surface mine, which contributed substantially to nickel production during the war and since. Including these completed projects, the program has already involved capital expenditures of more than $100-million. When the program is completed in 1953, the company's underground mines will be able to deliver 13-million tons of ore annually, compared with 5,700,000 tons of underground ore hoisted in 1950.



SYNCHRONOUS MOTORS on air compressors are ideal to correct mine plant power factor.

How Synchronous Motors Improve Plant Power Systems

A low plant power factor can result in stalled or overheated motors, poor lighting, higher maintenance costs, high power bills and lower production. One way of correcting a low power factor is to install synchronous motors. The author tells you why, and provides useful tables to help you compute the size of the synchronous motor installation necessary to correct the power factor at your mine plant.

J. C. MOORE
Large Motor and Generator Dept.
General Electric Co.

IN THESE DAYS of rapidly expanding production, many mine plant engineers are concerned about increasing the load on power systems that are already loaded almost to capacity. Others are contemplating the addition of new power systems where existing systems obviously cannot handle an expanding load.

In either case, high plant power factors are of prime importance, because the load which any power system will carry is proportional to the plant power factor, which is expressed as kw. load divided by the kva load. The efficiency of the whole plant power system increases as the power factor approaches unity. A higher power factor may make it possible to safely increase the hp. load on an existing system. It can also mean less investment in transformers, feeder lines, and voltage-

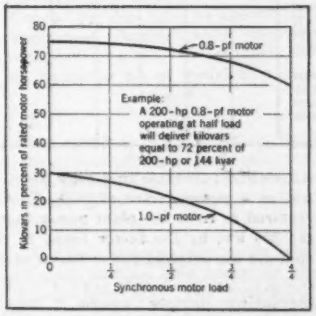


Fig. 1. Synchronous motors correct plant power factor by delivering kilovars to the system. This graph tells you how many kvar. will be delivered to the power system by synchronous motors operating at 1.0 pf and at 0.8 pf. Example: a 200-hp., 0.8-pf motor operating at half-load will deliver kvar, equal to 72% of 200 hp., or 144 kvar. Next, consult Fig. II to learn how to use these kvar's.

Fig. II—How to determine kvar. needed to improve plant power factor

Original Power Factor (cos θ_1)	Desired Improved Power Factor (cos θ_2)																				
	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.0
0.50	0.982	1.008	1.034	1.060	1.086	1.112	1.139	1.165	1.192	1.220	1.248	1.276	1.306	1.337	1.369	1.403	1.440	1.481	1.529	1.589	1.732
0.51	0.937	0.962	0.989	1.015	1.041	1.067	1.094	1.120	1.147	1.175	1.203	1.231	1.261	1.292	1.324	1.358	1.395	1.436	1.484	1.544	1.687
0.52	0.893	0.919	0.945	0.971	0.997	1.023	1.050	1.076	1.103	1.131	1.159	1.187	1.217	1.248	1.280	1.314	1.351	1.392	1.440	1.500	1.643
0.53	0.850	0.876	0.902	0.928	0.954	0.980	1.007	1.033	1.060	1.088	1.116	1.144	1.174	1.205	1.237	1.271	1.308	1.349	1.397	1.457	1.600
0.54	0.809	0.835	0.861	0.887	0.913	0.939	0.966	0.992	1.019	1.047	1.075	1.103	1.133	1.164	1.196	1.230	1.267	1.308	1.356	1.416	1.559
0.55	0.769	0.795	0.821	0.847	0.873	0.899	0.926	0.952	0.979	1.007	1.035	1.063	1.093	1.124	1.156	1.190	1.227	1.268	1.316	1.376	1.519
0.56	0.730	0.756	0.782	0.808	0.834	0.860	0.887	0.913	0.940	0.968	0.996	1.024	1.054	1.085	1.117	1.151	1.188	1.229	1.277	1.337	1.480
0.57	0.692	0.718	0.744	0.770	0.796	0.822	0.849	0.875	0.902	0.930	0.958	0.986	1.016	1.047	1.079	1.113	1.150	1.191	1.239	1.299	1.442
0.58	0.655	0.681	0.707	0.733	0.759	0.785	0.812	0.838	0.865	0.893	0.921	0.949	0.979	1.010	1.042	1.076	1.113	1.154	1.202	1.262	1.405
0.59	0.619	0.645	0.671	0.697	0.723	0.749	0.776	0.802	0.829	0.857	0.885	0.913	0.943	0.974	1.006	1.040	1.077	1.118	1.166	1.226	1.369
0.60	0.583	0.609	0.635	0.661	0.687	0.713	0.740	0.766	0.793	0.821	0.849	0.877	0.907	0.938	0.970	1.004	1.041	1.082	1.130	1.190	1.333
0.61	0.549	0.575	0.601	0.627	0.653	0.679	0.706	0.732	0.759	0.787	0.815	0.843	0.873	0.904	0.936	0.970	1.007	1.048	1.096	1.156	1.299
0.62	0.516	0.542	0.568	0.594	0.620	0.646	0.673	0.699	0.726	0.754	0.782	0.810	0.840	0.871	0.903	0.937	0.974	1.015	1.063	1.123	1.266
0.63	0.483	0.509	0.535	0.561	0.587	0.613	0.640	0.666	0.693	0.721	0.749	0.777	0.807	0.838	0.870	0.904	0.941	0.982	1.030	1.090	1.233
0.64	0.451	0.474	0.503	0.529	0.555	0.581	0.608	0.634	0.661	0.689	0.717	0.745	0.775	0.806	0.838	0.872	0.909	0.950	0.998	1.058	1.201
0.65	0.419	0.445	0.471	0.497	0.523	0.549	0.576	0.602	0.629	0.657	0.685	0.713	0.743	0.774	0.806	0.840	0.877	0.918	0.966	1.026	1.169
0.66	0.388	0.414	0.440	0.466	0.492	0.518	0.545	0.571	0.598	0.626	0.654	0.682	0.712	0.743	0.775	0.809	0.846	0.887	0.935	0.995	1.138
0.67	0.358	0.384	0.410	0.436	0.462	0.488	0.515	0.541	0.568	0.596	0.624	0.652	0.682	0.713	0.745	0.779	0.816	0.857	0.905	0.965	1.108
0.68	0.328	0.354	0.380	0.406	0.432	0.458	0.485	0.511	0.538	0.566	0.594	0.622	0.652	0.683	0.715	0.749	0.786	0.827	0.875	0.935	1.078
0.69	0.299	0.325	0.351	0.377	0.403	0.429	0.456	0.482	0.509	0.537	0.565	0.593	0.623	0.654	0.686	0.720	0.757	0.798	0.846	0.906	1.049
0.70	0.270	0.296	0.322	0.348	0.374	0.400	0.427	0.453	0.480	0.508	0.536	0.564	0.594	0.625	0.657	0.691	0.728	0.769	0.817	0.877	1.020
0.71	0.242	0.268	0.294	0.320	0.346	0.372	0.399	0.425	0.452	0.480	0.508	0.536	0.566	0.597	0.629	0.663	0.700	0.741	0.789	0.849	0.992
0.72	0.214	0.240	0.266	0.292	0.318	0.344	0.371	0.397	0.424	0.452	0.480	0.508	0.538	0.569	0.601	0.635	0.672	0.713	0.761	0.821	0.964
0.73	0.186	0.212	0.238	0.264	0.290	0.316	0.343	0.369	0.396	0.424	0.452	0.480	0.510	0.541	0.573	0.607	0.644	0.685	0.733	0.793	0.936
0.74	0.159	0.185	0.211	0.237	0.263	0.289	0.316	0.342	0.369	0.397	0.425	0.453	0.483	0.514	0.546	0.580	0.617	0.658	0.706	0.766	0.909
0.75	0.132	0.158	0.184	0.210	0.236	0.262	0.289	0.315	0.342	0.370	0.398	0.426	0.456	0.487	0.519	0.553	0.590	0.631	0.679	0.739	0.882
0.76	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.288	0.315	0.343	0.371	0.399	0.429	0.460	0.492	0.526	0.563	0.604	0.652	0.712	0.855
0.77	0.079	0.105	0.131	0.157	0.183	0.209	0.236	0.262	0.289	0.317	0.345	0.373	0.403	0.434	0.466	0.500	0.537	0.578	0.626	0.686	0.829
0.78	0.052	0.078	0.104	0.130	0.156	0.182	0.209	0.235	0.262	0.290	0.318	0.346	0.376	0.407	0.439	0.473	0.510	0.551	0.599	0.659	0.802
0.79	0.026	0.052	0.078	0.104	0.130	0.156	0.183	0.209	0.236	0.264	0.292	0.320	0.350	0.381	0.413	0.447	0.484	0.525	0.573	0.633	0.776
0.80	0.000	0.026	0.052	0.078	0.104	0.130	0.157	0.183	0.210	0.238	0.266	0.294	0.324	0.355	0.387	0.421	0.458	0.499	0.547	0.609	0.750
0.81		0.000	0.026	0.052	0.078	0.104	0.131	0.157	0.184	0.212	0.240	0.268	0.298	0.329	0.361	0.395	0.432	0.473	0.521	0.581	0.724
0.82			0.000	0.026	0.052	0.078	0.105	0.131	0.158	0.186	0.214	0.242	0.272	0.303	0.335	0.369	0.406	0.447	0.495	0.555	0.698
0.83				0.000	0.026	0.052	0.079	0.105	0.132	0.160	0.188	0.216	0.246	0.277	0.309	0.343	0.380	0.421	0.469	0.529	0.672
0.84					0.000	0.026	0.053	0.079	0.106	0.134	0.162	0.190	0.220	0.251	0.283	0.317	0.354	0.395	0.443	0.503	0.646
0.85						0.000	0.027	0.053	0.080	0.108	0.136	0.164	0.194	0.225	0.257	0.291	0.328	0.369	0.417	0.477	0.620
0.86							0.000	0.026	0.053	0.081	0.109	0.137	0.167	0.198	0.230	0.264	0.301	0.342	0.390	0.450	0.593
0.87								0.000	0.027	0.055	0.083	0.111	0.141	0.172	0.204	0.238	0.275	0.316	0.364	0.424	0.567
0.88									0.000	0.028	0.056	0.084	0.114	0.145	0.177	0.211	0.248	0.289	0.337	0.397	0.540
0.89										0.000	0.028	0.056	0.086	0.117	0.149	0.183	0.220	0.261	0.309	0.369	0.512
0.90											0.000	0.028	0.058	0.089	0.121	0.155	0.192	0.233	0.281	0.341	0.484
0.91												0.000	0.030	0.061	0.093	0.127	0.164	0.205	0.253	0.313	0.456
0.92													0.000	0.031	0.063	0.097	0.134	0.175	0.223	0.283	0.426
0.93														0.000	0.032	0.066	0.103	0.144	0.192	0.252	0.395
0.94															0.000	0.034	0.071	0.112	0.160	0.220	0.363
0.95																0.000	0.037	0.079	0.126	0.186	0.329
0.96																	0.000	0.041	0.089	0.149	0.292
0.97																		0.000	0.048	0.108	0.251
0.98																			0.000	0.060	0.203
0.99																				0.000	0.143
																					0.000

EXAMPLE: Assume that your plant has an input of 200 kw. at a power factor of 80%. To find the reactive kva required to raise the plant power factor to 95%, multiply the 200 kw. by the factor found in the table under 95% opposite the original power factor of 80%, or 0.421. Kvar. required, therefore, is 200 x 0.421, or 84.2 kvar. Having determined the kvar. needed, refer next to Fig. III on following page which tells how large the synchronous motor installation will have to be (in terms of horsepower) to supply the necessary kvar. for power factor correction.

regulating devices where a new system is required.

Good operating conditions require high power factors, too. Poor power factor often results in voltage drops which increase the slip of induction motors to the point where production is adversely affected. If the voltage drops more than 10% below normal, it is quite possible for induction motors to become overheated or stall. And high power system losses, poor plant lighting conditions, high power bills, and increased maintenance of the power supply commonly accompany poor power factor.

In most power systems, poor power factor is caused by excessive demands for magnetizing current (reactive kva) by induction motors at part loads, transformers, electric furnaces, electric welders, and other inductive equipment. This magnetizing current, although necessary, does no useful work, and limits the power which a system can carry.

When a new motor drive (75 hp. or larger) is needed in a plant, the installation of a synchronous motor can economically improve plant power factor. A unity power factor synchronous motor (current in phase with the voltage) accomplishes this by adding to the kw. load on a power system without increasing the reactive kva load, since it needs no magnetizing current to operate when normally excited at full load. In other

words, it brings the ratio $\frac{\text{kw.}}{\text{kva}}$ closer to 1. For example, if a 1,000-hp. unity power factor synchronous motor is added to a 1,000-hp. plant load having a power factor of .80, the new load of 2,000 hp. would have a power factor of .935.

A leading power factor synchronous motor (current leading the voltage) improves plant power factor because it acts as a kvar. generator, and can supply fairly large amounts of kvar. to a power system while performing its usual driving duties.

The ability of either unit power factor or 0.8-pf synchronous motors to improve power factor is a function of load and excitation. Decreasing the mechanical load without changing the field excitation increases the reactive kva output of the motor. Fig. 1 shows the reactive kva that two typical synchronous motors will deliver under various load conditions with normal excitation. It is seldom economical to operate a synchronous motor at part load in order to gain greater power-factor improvement and the motor should never be overexcited for this purpose, as this practice can lead to serious overheating of equipment.

Efficiency Is Higher

Another desirable characteristic of the synchronous motor is its tendency to stabilize voltage of the plant power supply. Under conditions of high voltage, the reactive kva furnished by a synchronous motor decreases, and under conditions of low voltage within reasonable limits, it increases. The motor, therefore, has a tendency to hold a constant voltage in the power supply.

Furthermore, synchronous motors usually have a higher full-load efficiency than any other type of motor, and produce a greater amount of work per dollar's worth of power consumed. Where loads are heavy and continuous, an advantage of from 0.5 to 3.0% in efficiency saves a considerable sum in operating expense, and leaves more power available for other plant equipment. At reduced loads, the difference becomes greater to a marked degree, for an efficiency of 75% at 5% load has been attained in a synchronous motor.

Whether or not a synchronous motor should be installed for power factor correction depends upon several factors. A careful study might reveal that the particular plant and application might lend themselves better to induction motors and capacitors under certain conditions. The total cost, total load, present power factor, and amount of power factor improvement desired all have a bearing on the type of apparatus best suited for improving the power factor. And the provisions made for obtaining a high power factor in a brand new plant are likely to be quite different from those feasible in an existing plant.

Fig. 2 is a tabulation of multipliers which may be used to determine the number of kvar. required to improve power factor by given degrees. Fig. 3 shows the kvar. generated by synchronous motors per kw. input at various power factors. These tables may be used together to determine the approximate size of synchronous motor which would be needed to accomplish a required power factor improvement.

Note These Advantages

Besides their ability to improve the efficiency of plant power systems, synchronous motors have other desirable characteristics which make them especially suitable for many kinds of large motor drives. Some of these are:

1. They may be obtained at very low speeds, thus eliminating or reducing the need for speed-reducing gears.

2. The construction of low-speed synchronous motors results in a saving in space along the shaft when the motor is to be overhung or built into the driven machine.

3. Split rotor construction is optional in low-speed types, which facilitates assembly on shaft of driven machines.

4. Low maintenance costs are the result of inherently simple construction which leaves all parts accessible.

5. In ratings where the horsepower is equal to or greater than the speed, they have a lower first cost, including control and exciter, than any other ac motor with its control.

6. A wide range of torques is available to make possible starting under heavy loads.

7. Dynamic braking brings heavy loads to a smooth, quick stop.

8. Since they run at an exact rated speed, they insure a constant rate of production in constant-speed applications. This constant-speed feature is not affected by voltage changes.

9. They have an inherently large air gap, making field assembly and maintenance easy and economical.

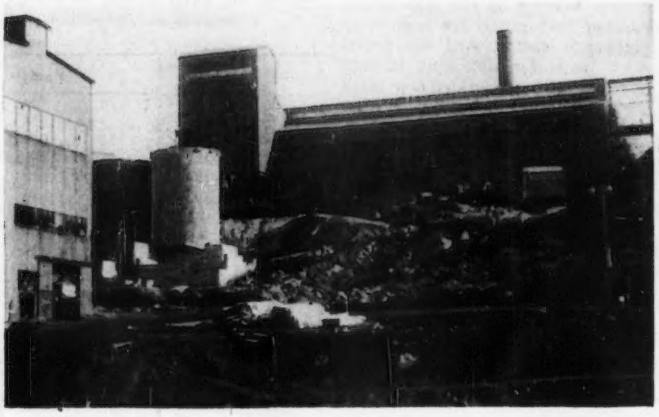
The combined economic and operating advantages of synchronous motors make their consideration worth-while where any plant requires a new large motor drive. In many instances the installation of synchronous motors is the most economical method of improving plant power factor when their ability to provide efficient mechanical power at the same time is considered.

FIG. III. This table enables you to determine how large (how many horsepower) a synchronous motor installation must be for a given pf rating to deliver the kvar. needed to correct your plant power factor.

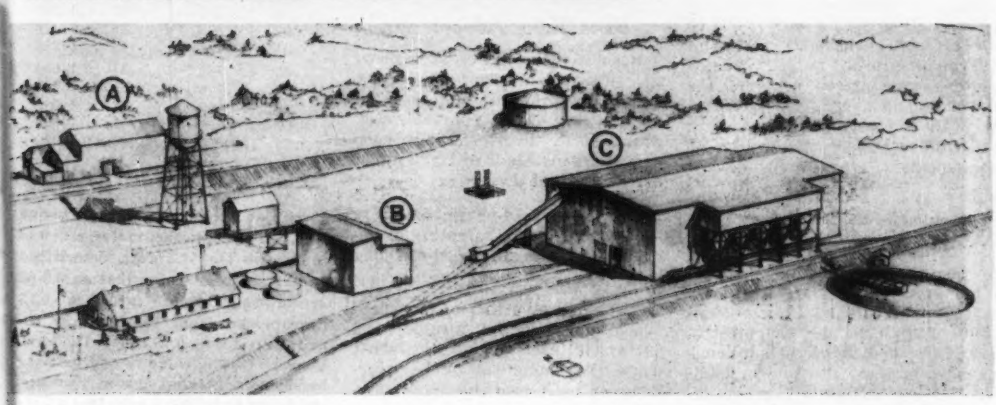
Pf	Kvar.	Pf	Kvar.
1.00	.000	.74	.909
.99	.142	.73	.936
.98	.203	.72	.964
.97	.251	.71	.992
.96	.292	.70	1.020
.95	.329	.69	1.049
.94	.363	.68	1.078
.93	.395	.67	1.108
.92	.426	.66	1.138
.91	.456	.65	1.169
.90	.482	.64	1.201
.89	.512	.63	1.233
.88	.540	.62	1.266
.87	.567	.61	1.299
.86	.593	.60	1.333
.85	.620	.59	1.368
.84	.646	.58	1.405
.83	.672	.57	1.442
.82	.698	.56	1.479
.81	.724	.55	1.508
.80	.750	.54	1.559
.79	.776	.53	1.600
.78	.802	.52	1.643
.77	.829	.51	1.687
.76	.855	.50	1.732
.75	.882		

Example: To find horsepower rating of 0.8-pf synchronous motor required to furnish the 84.2 kvar. determined by Fig. 2. Table shows that an 0.8-pf synchronous motor furnishes 0.75 kvar. per kw. input. The 84.2 kvar. required divided by 0.75 equals 112.3 kw. Converting this value to approximate horsepower (neglect motor efficiency and divide by 0.746), we see that a 150-hp. motor at 0.8 pf would be recommended.

THIS MONTH IN MINING



FORERUNNER of Reserve Mining Co.'s projected large-scale plant, the single-section plant, here seen in part, now being provided at Babbitt by rebuilding and re-equipping the Mesabi Iron Co.'s plant, will have a capacity of 300,000 tons of finished product per year. In it Reserve's beneficiation process will be studied further and perfected while the large-scale plant at Beaver Bay is being built. This photo was taken Sept. 28.



NOW UNDER CONSTRUCTION, 2 mi. northwest of Mountain Iron on the Mesabi Range is the half-million-ton experimental taconite pilot plant of Oliver Iron Mining Co. sketched here. Coarse crushing and fine crushing will be done at *A* and *B* respectively. Magnetic separation and other concentration operations will be done at *C*.

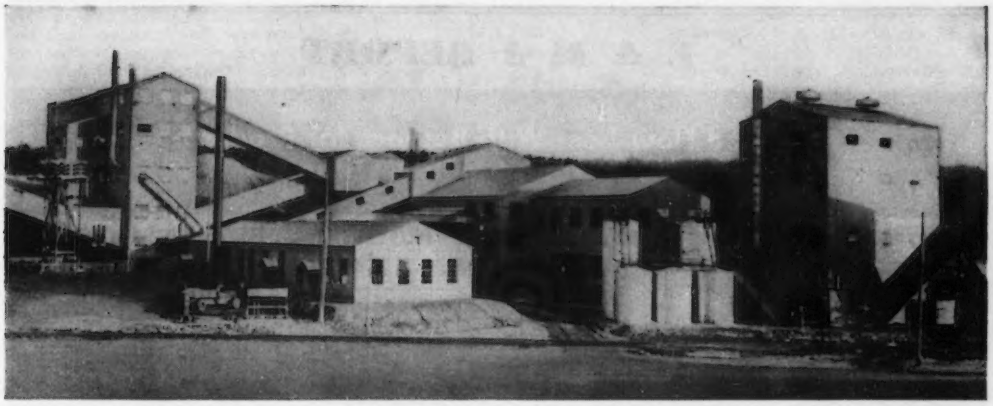
Full-Scale Taconite Beneficiation Nearer

Construction contract for long-considered commercial plant at Beaver Bay awarded by Reserve Mining Co. Two groups of steel companies, also the Steel Corporation, now have projects in hand.

BENEFICIATION OF TACONITE at last appears to be going places. Reserve Mining Co. has announced its long-awaited decision to build a plant of commercial size for beneficiating the magnetic variety of this low-grade iron-bearing material which occurs in large tonnages on the Mesabi Range. The site will be that selected five years ago at Beaver Bay, on the north shore of Lake Superior 55 mi. from Duluth. The plant will have a capacity of 2½-million tons of finished product per year, requiring the mining of 7½-million tons of crude taconite annually. Cost is expected to exceed $75-million. To reach the production point, it is anticipated, will take four years. Besides the plant the project includes a 47-mi. railroad, to be built to Beaver Bay from Reserve's mining property at Babbitt on the Range, an ore-loading dock, employee houses, and other facilities.

This full-scale plant will be the first to produce a blast-furnace feed from Minnesota taconite in commercial tonnages. The venture is the result of many years of study. Indirectly, the length of time required to get the project past the preliminary stage and under way is testimony to the magnitude of the undertaking.

Reserve is owned by the Republic, Armco, and National steel com-



OUTSTANDING SOURCE TO DATE of taconite concentrates in appreciable tonnages is Erie Mining Co.'s pilot taconite beneficiation plant, here seen, at Aurora on the Mesabi Range. Its capacity is rated at 200,000 tons of product yearly. The plant has shipped an important tonnage of pelletized ore to furnaces since it was put in commission in June, 1948. Three-stage crushing is done in buildings at left; magnetic separation, balling, and other milling operations are conducted in center buildings, and pelletizing is done in building at right.

panies and managed by Oglebay, Norton & Co. It has awarded a construction contract for the plant to a group of three contractors associated for the purpose under the name of Hunkin-Arundel-Dixon. They include: The Hunkin-Conkey Construction Co., Cleveland; the Arundel Corporation, Baltimore; and L. E. Dixon Co., San Gabriel, Calif.

Crushing, grinding, magnetic separation and pelletizing will feature the flowsheet (see also *E&MJ*, July, 1949, pp. 86-88). The crude taconite running 24-25% iron will yield a furnace product analyzing about 64% in iron.

Preliminary to full-scale beneficiation work at Beaver Bay, Reserve has been rebuilding and reequipping the Mesabi Iron Co. plant at Babbitt, Minn., to serve as a one-section beneficiating plant of 300,000 tons per year capacity. This is expected to be in operation sometime in 1952. It will permit the beneficiation process to be studied further and perfected while the Beaver Bay plant is being built.

The latter plant will be designed in multiples of the section that results from the work at Babbitt. Eight such sections will be included in the first phase of construction at Beaver Bay. For the eventual 10-million-ton plant, 32 sections are contemplated. Provision is being made for this enlargement. Power plant capacity and heavy foundation work are included in the current project to accommodate at least a portion of the additional capacity.

Elsewhere in today's picture of taconite beneficiation on the Mesabi are the following two important projects:

1. Erie Mining Co. is operating the only existing plant for concentrating and pelletizing Mesabi taconite. This is its 200,000-ton pilot plant at Aurora. Owned by Bethlehem Steel Co., Youngstown Sheet & Tube Co. and Interlake Iron Corp., Erie has been shipping satisfactory pellets from this plant to the furnaces by the boatload. The plant was put in commission in mid-1948 after years of laboratory and large-scale test work. Early announcement that its owners have decided to build a commercial-scale plant would not be surprising.

2. The remaining project is that of the 500,000-ton taconite concentrator for which ground was broken last May by Oliver Iron Mining Co., U. S. Steel subsidiary, at a site 2 mi. from Mountain Iron. This plant is to be in operation in mid-1952. Crushing, grinding, and magnetic separation will feature the concentration flowsheet. The nonmagnetic iron mineral in the taconite is also to be separated from the silica.

Anticipated Tonnages of Taconite Concentrates, 1951-1960

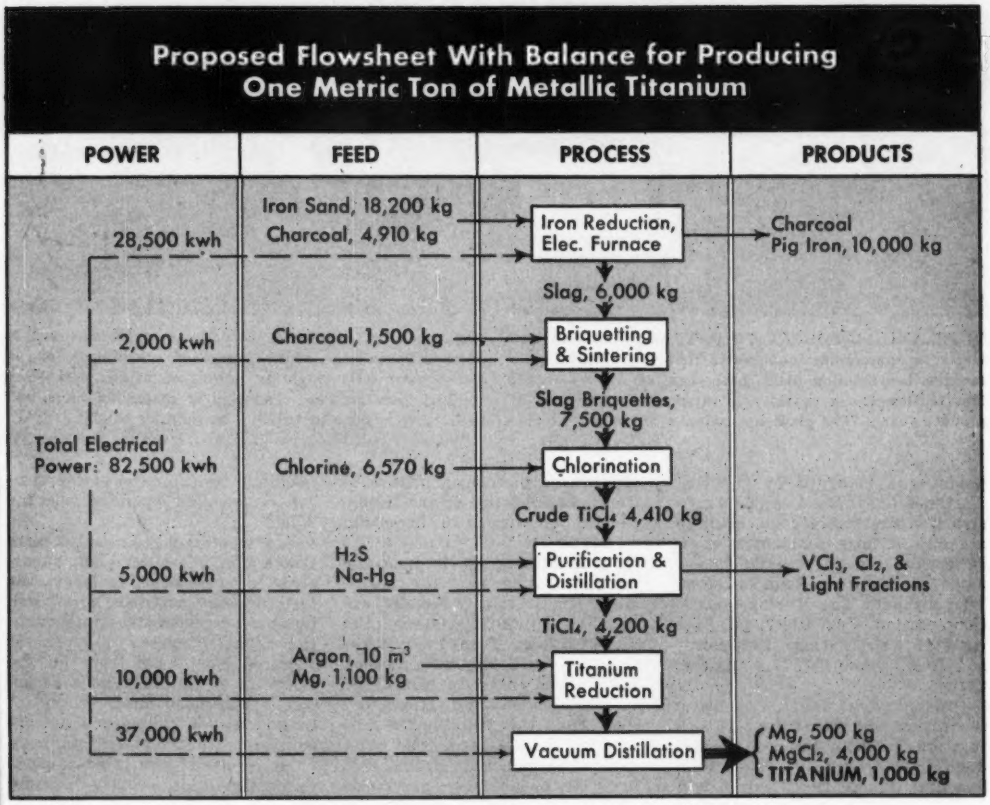
Year	Gross Tons, Millions
1951	0.2
1952	1.0
1953	1.0
1954	2.5
1955	6.0
1960	13.5

Agglomeration of the concentrates from the latter plant apparently is to be done, in large-scale tests at least, at Oliver's new million-ton experimental agglomeration plant completed this year at Virginia, 8 mi. away from the concentrator by rail and near the company's Rouchleau mine. This plant comprises two units—one a fully equipped Dwight-Lloyd sintering plant in itself; the other a plant comprising a large rotary calcining kiln for nodulizing. The combined capacity of these units is ample to deal with any taconite concentrates received as well as with the high-grade fine-structure ores from the Rouchleau and nearby mines, which no doubt can be agglomerated to advantage on the Range before being shipped to the furnaces.

The Look Ahead

Step by step, important progress is being made toward the utilization of the Mesabi's taconite resources as a source of iron, to replace its reserves of high-grade ore now seen diminishing. The adjacent tabulated figures showing 13½-million tons of taconite concentrates in 1960 give the best idea obtainable as to how the tonnage of beneficiated taconite may be expected to grow. This estimate was presented to the House Committee on Public Works last spring by Secretary of Interior Chapman, in testifying in support of the St. Lawrence Seaway.

E & M J REPORT



Japanese Plan to Produce Titanium

A JAPANESE STEEL COMPANY plans to produce metallic titanium. Iron-sand deposits of Japan contain substantial amounts of titanium, and a young Japanese chemical engineer has worked out (on a laboratory scale) a system for producing charcoal pig iron and metallic titanium.

For years Osaka Special Steel Co. has produced charcoal pig iron from iron sands. The resulting electric-furnace slag contained about 50% titanium dioxide. Hiroshi Ishizuka, son of the firm's founder-president, graduated from Osaka University in 1946, and decided to find a market for the waste titanium slag. He retired to the family laboratory in 1946, and early in 1951 announced a successful laboratory method of producing metallic titanium from the slag. The company, believing it can produce low-cost titanium by the flowsheet outlined above, plans to build an initial 3-ton-per-month pilot plant, followed by a 10-ton-per-month production plant that could later be expanded to 30 tons per month. A final larger production unit would be built near a source of power developed for titanium production.

This is the analysis of titanium so far produced in the laboratory:

Titanium	99.5%
Iron	0.028
Silicon	0.015
Manganese	0.035
Copper	0.002
Phosphorous	0.001
Calcium	0.014
Magnesium	0.284
Chlorine	0.143

American Zinc Buys and Discovers New Reserves

American Zinc, Lead and Smelting Co. recently disclosed that, by a discovery and a purchase, it had added substantially to its reserves of zinc and lead: 1. Surface drilling at the company's properties in northeastern Tennessee has indicated ore equivalent to 1-million tons of zinc concentrate. 2. Effective Oct. 1, the company purchased all holdings of the Nellie B. Mining Co. near Picher, Okla.

The newly announced Tennessee discovery, which the company has been surface drilling for some time, is

considered of first importance: American Zinc usually figures reserves on the basis of concentrates containing 60% zinc. On that basis, the new ore would contain 1.2-billion lb. of zinc recoverable in milling. According to a statement by President Howard I. Young, "It shall be our policy to crowd the major development required to bring these ores into production as soon as possible. At best, this will take from 18 months to two years and require a substantial capital investment."

The newly purchased Nellie B. Mining Co. gives American Zinc a system of producing mining and concentrating plants, and leases on 1,360 acres in the heart of the Tri-State district. The Nellie B., now the second largest Tri-State producer, currently produces 3,000 to 4,000 tons of zinc-lead ores daily, treats it at three concentrating plants to produce 30,000 tons of lead and zinc concentrates yearly. It will be able to produce approximately 12% of the company's zinc-smelter feed.

First Uranium Producing 200 Tons Tin-Copper Ore

The First Uranium Corp. is currently producing 200 daily tons of tin-copper ore from its mine in Pershing County north of Imlay, Nevada. The ore (average recovery about $30 in total metal content) is then processed in the company's recently completed $400,000 mill, which is believed to be unique in the mineral field.

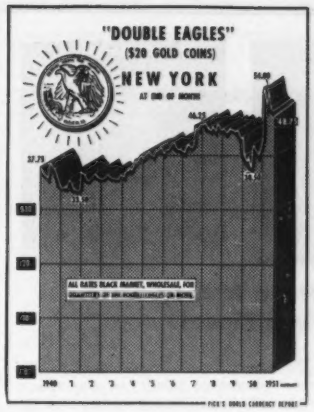
The milling process was evolved by American Cyanamid Co. over a 2-yr. period; it consists of gravity separation of the tin, followed by flotation recovery of copper, gold, and silver minerals.

President C. R. Quinlisk of Reno reports that 30 men are employed on the site—10 of them underground and 20 at the mill and offices. Underground development consists of nearly 3,000 ft. of drifts and crosscuts, and about 450 ft. of shrinkage raises.

The ore is of an explosive breccia type; Mr. Quinlisk reports an estimated million tons blocked out. He has hopes of making the property one of the chief tin producers on the continent. Working on the operation are Ralph Thurston, chief geologist and mining engineer; William F. Jameson, general superintendent; and John Jan, mill superintendent.

West Indies Ships First Iron Ore to U. S.

First shipments have been made from the new Keystone mine of the West Indies Mining Corp. in Puerto Rico. Walter Steinke is general superintendent at the mine; James B. Hustad, formerly with the Oliver Iron Mining Co. in Duluth, is president; and Robert D. Crassweller of Duluth is secretary-treasurer. All three men are in Puerto Rico.



What U. S. Hoarders Think Gold is Worth

Double Eagles are more popular hoarding objects than gold bars. The bars, worth around $17,000 apiece, are too expensive for the average investor and much too difficult to buy or sell.

Therefore, the black market price of these gold coins reflects to a much better degree the popular interest in gold.

The above graph shows not only what hoarders are willing to pay for gold, but it also shows the inadequacy of the official U. S. gold price of $35 per oz.

New Uranium Field Shows Promise

Chances for commercial development in **Saskatchewan's newest uranium field** around Charlebois and Spreckley Lakes are "excellent," according to Dr. J. B. Mawdsley who is leading a geological survey party in that area this summer. The new area is about 40 mi. northeast of Black Lake, where an earlier find was made.

Mineralization in the Charlebois-Spreckley field consists of pegmatite or coarse granite containing minute crystals of uranium mineral, as distinguished from Lac la Rouge's coarse pegmatites, and Beaverlodge's pitchblendes.

In this first year of large-scale development in the Charlebois-Spreckley field, four companies are active: Charlebois Lake Uranium, Ltd.; Dee Exploration, Ltd.; Consolidated Mining and Smelting; and Partridge and Associates.

Himalayan Zinc Deposit To Be Developed

Zinc deposits in Nepal, remote Himalayan kingdom between India and Tibet, are to be exploited by a new combine known as the Himalayan Syndicate in cooperation with the Tata Iron and Steel Co. A good grade of ore has been located by the Nepal Bureau of Mines in an area 10 mi. northeast of Khatmandu. The Syndicate is waiting for political disturbances to simmer down before sending 25 prospectors into the district. The ultimate cost of the project is expected to be $4-million.

ALCOA's Lignite-Powered Smelter Now Being Built

After receiving a certificate of necessity for its new aluminum smelter at Rockdale, Tex., ALCOA started surveying the site in September, and scheduled the start of construction for mid-October.

Men in charge of the operations are Works Manager John D. Harper and Construction Superintendent Len B. Neubert. ALCOA expects to be in operation in late 1952, and to reach 170-million lb. per year (full capacity) in 1953.

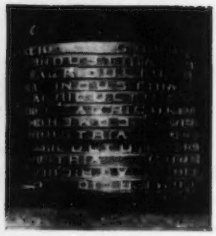
At full capacity, Rockdale will employ 1,000 men, will get alumina from ALCOA's refining plant at Mobile, Ala., and from its plant now being built in Arkansas.

Power will eventually come from a lignite-burning plant designed, constructed and operated by Texas Power & Light Co. Initially, crushed and dried lignite will be used for fuel at that plant. Later a carbonization plant will be installed, which will remove low-temperature tars and produce high-grade char for the burners. The tars will then be distilled to produce valuable chemical by-products.

Free World Makes Plans To End Sulphur Shortage

Speaking to an AIME group, J. C. Carrington, assistant to the president of Freeport Sulphur Co., outlined the all-out drive that the free world is making to end the sulphur shortage.

In 1950 the free world produced 10,700,000 tons. By the end of 1953, it will add another 3-million tons through 46 current projects, 24 of which are in the United States.



Mexico Mints Hard Money—1-Million 5-Peso Pieces

The Mexico Casa de Moneda (mint) is now minting 1-million handsome 5-peso coins which carry the likeness of the national hero, Father Hidalgo.

Reason: To replace 1-peso notes, which have been too "soft," too small, and too easily destroyed.

Interesting Features: 1) Instead of the usual milled edge, the coins carry the words "AGRICULTURA, INDUSTRIA, COMMERCIO." 2) The coins have a high silver content (72% silver, 28% copper). 3) Each 5-peso coin contains 20 net grams of silver, so the silver alone is worth 56.61¢ at the Oct. 18 price of 88¢ per oz. At the Oct. 18 official rate of exchange of 11.58¢ per peso, the coins are valued at 57.90¢—very low for a coin of such high metal value.

Outlook: The high metal content of the coins will help to stabilize the peso, will make the coins dear within Mexico and will create an internal demand for more such coins. Metal observers rate Mexico's move as a smart one.

IN THE UNITED STATES

★The establishment of several primary magnetic base stations near important iron-producing districts in Minnesota, Michigan, and Wisconsin is described and suggestions for using them as an aid to geophysical prospecting are made in a Bureau of Mines report released today by Secretary of the Interior Oscar L. Chapman. A free copy of Report of Investigations 4804, "Magnetic Base Stations in Lake Superior Iron Districts," can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

★Secretary of the Interior Oscar L. Chapman announced that the approval and signing of 17 new mineral exploration project contracts in 10 states during the last half of September, raises the total of such contracts to 160 since the start of the Defense Minerals Administration's financial assistance program in search of critical and strategic mineral reserves last April.

The contracts just completed cover explorations for lead, zinc, tungsten, copper, beryl, mica, columbite, antimony, and tantalum. The projects are in 10 states—Montana, Idaho, Colorado, Wisconsin, Utah, California, Nevada, Oklahoma, Missouri, and South Dakota. Cost of the new projects will be $706,304, of which the government's share will be $374,122.

ALASKA

★**Ten camps were active on creeks in the Circle district this summer:**

A. A. "Tony" Zimmerman on Independence Creek.
Ray Hamilton on Harrison Creek.
Walter Roman on Mastodon Creek.
C. J. Berry Dredging Co. on Mammoth Creek.
Casper Ellenger on Deadwood Creek.
Parker Hopkins and Raymond on Deadwood Creek.
Jens Langlow on Switch Creek.
Heinie Garstens on Portage Creek.
Fasco and Gibson on Eagle Creek.
Bob Watkins on Faith Creek.

★According to Charles F. Herbert, the **Alaska Copper Corp.'s** property on Fidalgo Bay will be developed this fall. Herbert and others of **Yukon Placers** recently bought Alaska Copper's stock.

★**Zenda Gold Mining Co.** of Las Vegas, Nev., has optioned, from Mrs. H. A. Peterson of Teller, and Harry B. Palmer of Fairbanks, leases on Cape and Boulder Creeks. Zenda is reported to have received a $54,000 DMA loan for development.

★S. H. Lorain, chief, Region 1 of the U. S. Bureau of Mines, and Kenneth Kadow, U. S. Tin Mines, met with Dan Jones of the Territorial Assay office, and Antonio Polet of Alaska Development Board at Nome. They discussed ways of getting better roads to inaccessible properties between Nome and Teller. Iron ore, antimony and bismuth are among the minerals of interest in the area.

ARIZONA

★Two Arizona copper projects have been certified to the treasury by DPA for accelerated tax amortization: The new Lavender open-pit operation at Bisbee by the **Phelps Dodge Corp.**, 13,910,000, 75% of the estimated cost; and **United Mine Operators** at Wickenburg, $76,000, or 75% of total cost.

★The preliminary report on lead, gold, zinc, and silver operations of the **Iron King Mine** in Yavapai County has been placed on open file. Prepared by S. C. Creasey for the Geological Survey, the study covers the 12 steeply echeloned massive sulphide veins which contain quartz, ankerite, pyrite, arsenopyrite, sphalerite, galena, chalcopyrite, and tennantite. Copies are available at the Arizona Bureau of Mines, Tucson; University of California library; and Geological Survey Library, Washington, D. C.

★Arizona miners rank at the top in the state's average of earned income. During 1950 the average wage of employees covered by the Employment Security Commission, State Insurance Agency, was $3,049; that of the mining industry was $3,991. Wage payments to mining employees in the mining industry amounted to $47,309,124 during 1950.

★**The search for tungsten in Arizona has increased** considerably in recent months, spurred by the government floor of $63 per unit for specification grade concentrates.

Total production of the state since the tungsten mining began about 1900 is $4,600,000, mainly during the two world wars and in the mid thirties. Production through intervening years was spotty. Only the wolframites and scheelite have been of commercial importance, although tungsten minerals in the state include powellite, cuprotungstite, and tungstite. Shipments had skidded from 246 short tons in 1941 to less than a ton in 1949. But with China imports unavailable, several small gravity concentrators have started production, and the Hillside plant near Bagdad and the Picacho plant near Sells are adding flotation sections.

★Central Arizona's first uranium ore shipment was made in late September. The shippers, Charles H. Dunning, Phoenix, former director of the Arizona Department of Mineral Resources, and Fred Schemmer, Prescott, report the 25-ton shipment was selected for high assay value and was estimated at .65%, or 13 lb. per ton. The ore was mined from three locations near Prescott. Shippers claimed, however, that the 500-mi. haul to

(Continued on page 130)

Mine Lead Production

U.S. Bureau of Mines reports the following mine production of recoverable lead in the United States for July and August, in short tons:

Region and State	July	August
States East of Mississippi River:		
Southern Illinois & Kentucky	247	272
Northern Illinois & Wisconsin	137	174
New York, Tennessee & Virginia	81	126
West Central States:		
Arkansas	2	4
Kansas	835	897
Missouri	9,081	10,563
Oklahoma	1,266	1,313
Western States:		
Arizona	1,450	1,505
California	1,180	940
Colorado	2,528	2,580
Idaho	6,400	5,200
Montana	1,800	1,700
Nevada	530	510
New Mexico	488	452
Oregon	...	4
Texas	6	3
Utah	3,760	2,625
Washington	700	800
Total United States	30,491	29,668

Mine Zinc Production

U.S. Bureau of Mines reports the following mine production of recoverable zinc in the United States for July and August in short tons:

Region and State	July	August
States East of Mississippi River:		
Southern Illinois & Kentucky	652	741
Northern Illinois & Wisconsin	2,425	2,615
New Jersey, New York & Virginia	7,705	8,872
Tennessee	3,230	3,402
West Central States:		
Arkansas	2	3
Kansas	2,306	2,532
Missouri	749	839
Oklahoma	4,043	4,172
Western States:		
Arizona	4,025	4,750
California	730	690
Colorado	4,344	4,975
Idaho	6,300	6,100
Montana	6,950	6,900
Nevada	1,510	1,220
New Mexico	4,368	4,292
Oregon	...	4
Utah	2,500	1,925
Washington	1,540	1,570
Total United States	53,379	55,602

Official London Prices

Consumers in the United Kingdom obtain copper, lead and zinc at prices named by the British Ministry of Metals. Delivered prices in effect as October ended were as follows:

	Per Long Ton £	s.	d.
COPPER:			
Electrolytic, high conductivity	227	0	0
Fire refined, high conductivity	227	0	0
Fire refined, high grade	226	10	0
Fire refined, min. 99.7 percent	226	0	0
Fire refined, min. 99.2 percent	225	10	0
LEAD: (a)			
Soft, foreign duty paid	175	0	0
Soft, Empire	175	0	0
English, refined	176	10	0
ZINC:			
Foreign (G.o.b.) duty paid	190	0	0
Domestic (G.o.b.) duty paid	190	0	0
Prime Western and debased	190	0	0
Refined and electrolytic	194	0	0
Minimum 99.99 percent	196	0	0

(a) Effective Oct. 1.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

October 31, 1951

Aluminum, ingot, 99 plus percent, lb. (base price)	19c.
Antimony, spot, lb., 5 tons and up but less than carload in cases	45.35c.
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$2.55
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	(b) $2.40
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	56½c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	24½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$218 @ $220
Selenium, 99.5 percent, lb	$3.00 @ $3.50
Silicon, minimum 97 percent, carloads, lb.	20c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty. (b) Effective Oct. 1, 1951.

METALLIC ORES

Beryllium Ore, imported, 10 to 12% BeO, per unit	$33.00 @ $36.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3, no ratio	$27.00 @ $28.00
48% Cr_2O_3, 3 to 1 ratio	$43.00 @ $53.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$8.70
Mesabi bessemer	$8.45
Mesabi, non-bessemer	$8.30
Lead (Galena), 80 percent, Joplin, Mo., ton	$246.50
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, $1.20 @ $1.25, c.i.f. U. S. ports, duty extra. Long-term contract quotations are 85c. to 95c., c.i.f., duty extra.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60c.
Tantalite, 60% concentrate, per lb.	$2.00 @ $2.50
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, U. S. equivalent, duty extra	(a) $65.00
Domestic, scheelite, 60 percent f.o.b. mine	$65.00
Vanadium Ore, per lb. of contained VO_3 f.o.b. mines	31c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$135.00

(a) F.o.b. port of shipment.

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	6½c.
Cobalt Oxide, 72%, metallurgical grade, per lb. of Co	Nominal
Copper Sulphate, 100 lb.	$8.95 @ $9.95

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of alloy, 5 lb. ingot	$1.56
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	21¼c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$185.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent, per lb. of contained Si	12.4c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$5.00
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, max. 1½ percent carbon, per lb. contracts	9.9c.
Spiegeleisen, per long ton, 19 @ 21 percent grade	$75.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $900
Spinning fibers	$275 @ $475
Shingle fibers	$123 @ $170
Paper stock	$85 @ $119
Waste	$63 @ $70
Shorts	$30 @ $63
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or shorts	$34.00 @ $63.00
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00 @ $13.50
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$10.15 @ $10.40
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $4.50 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.50
Domestic, abrasive, 80 to 84 percent	(a) $18.00 @ $18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50 @ $9.50
North Carolina ceramic grade	$20.25 @ $22.25
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, CaF_2, ton	$43.00
Acid 97% concentrate, bulk, ton	$60.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$36.30
Mica—Domestic, f.o.b. mines. Punch 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 80 to 85c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap, $32 and up.	
Ocher, Georgia, ton, in sacks	$26.25
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	Not quoted
Sulphur, Texas, mines, long ton	$22.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$35.00

(a) Nominal.

IRON AND STEEL

Pig Iron, gross ton, basic, Valley furnaces	$52.00
Steel, f.o.b., Pittsburgh billets, net ton	$56.00
Structural shapes, 100 lb.	$3.65

WASHINGTON IMPACT

Mining Industry's 1951 Tax Gains Seem Likely To Withstand Assault

PRESIDENT TRUMAN didn't like the new tax bill, but his chances of getting Congress to change it in any important way next year don't look good. Election year will take the steam out of most of Truman's criticisms. As a result, important tax gains made by the mining industry look safe for a while. Here's a look at what mining got in the bill.

Percentage depletion. After considerable juggling between the Senate and the House, here is the final line-up on percentage depletion. Fifteen per cent was granted to metal mines, aplite, bauxite, fluorspar, flake graphite, vermiculite, beryl, garnet, feldspar, mica, talc (including pyrophyllite), lepidolite, spodumene, barite, ball clay, sagger clay, china clay, phosphate rock, rock asphalt, trona, bentonite, gilsonite, thenardite, borax, fuller's earth, tripoli, refractory and fire clay, quartzite, diatomaceous earth, metallurgical grade limestone, chemical grade limestone and potash.

Ten percent was granted to coal, asbestos, brucite, dolomite, magnesite, perlite, wollastonite, calcium carbonates and magnesium carbonates.

Five per cent was granted in case of sand, gravel, slate, stone (including pumice and scoria), brick and tile clay, shale, oyster shell, clam shell, granite, marble, sodium chloride and, if from brine wells, calcium chloride, magnesium chloride, and bromine.

The Senate stand in favor of adding to the list of minerals qualifying for percentage depletion is a reversal of its action when the Revenue Act of 1950 was being considered. It opposed additions at that time. Reason for its shift: Some minerals got percentage depletion under the old law, while competing minerals did not. Increased taxes made this inequality more important than in the past.

Despite an estimated $76-million loss in tax revenue, the liberalized depletion rule did not arouse much opposition. It was opposed by Senator Humphrey of Minnesota who tried in vain to knock it out. President Truman took a swipe at the depletion allowance policy in the statement he made in signing the bill.

Development expense. The Senate version prevailed, giving taxpayers all the benefit of the original house bill, plus a choice of when to take the allowed deduction.

The original purpose of the house bill was retained. It allows expenses for developing new mines to be deducted from income instead of being capitalized, as required in the past. The new rule applies where ore in marketable quantity has been proved, but the mine is not yet in commercial operation.

In effect this merely puts development expenses, incurred before commercial production, on the same basis as expenses for extending operations in a going mine.

The version as signed by the President allows the taxpayer a choice. He can either deduct development expenditures during the tax year in which they were made, or he can defer the deduction to the tax year in which resulting ores or minerals were sold.

This section of the new bill will cost the Government an estimated $20-million annual tax revenue.

Exploration expenses. The House accepted a Senate proposal to put exploration expenses in the same general class as development expenses, allowing them to be deducted from income rather than capitalized. The old law allowed exploration expenses to be deducted only when they failed to turn up a commercial deposit. This meant that expenses for successful explorations could be recovered for tax purposes only through depletion allowances. If the depletion allowance was based on a percentage of gross income, the deduction was the same no matter how much was spent. This had the practical effect of denying any tax inducement to the man who was willing to risk his money in exploration.

The new act provides this sort of inducement by allowing deductions up to $75,000 per year for each of four years.

The taxpayer has a choice of how he shall treat such expenditures. He may take the deduction in any amount up to $75,000 in the year the expenditure was made, or he may defer the deduction and take it as the minerals discovered are sold.

Taxpayers can take these deductions for four years only. The years need not be consecutive. But once taken, up to the limit of $75,000 per year ($300,000 in all), this provision of the new tax bill no longer applies. From that point on, such expenses again must be capitalized. The limitation of $75,000 per year applies to the taxpayer as an individual, and not each deposit being explored.

Both the four-year limitation, and the $75,000-per-year limitation, may well be liberalized in future bills, now that the principal is established. As long as the need for exploration is dramatized by shortages, the mining industry has a powerful argument in Congress.

Tax-exempt production. This provision is considerably less than the mining industry hoped for. It extends to sulphur, potash, and metallurgical and chemical grade limestone, the excess profits tax exemptions already granted to coal and metal mines.

In the case of deposits not in operation during the base period, a third of current net income is exempt from the excess profits tax. If the deposit was being operated in the base period, half of the net income received from output greater than the average annual production, is exempt.

Strategic materials. Bauxite was added to a list of strategic minerals exempt from the excess profits tax.

Foreign Producers Buck U. S. Metal Price Policy

TOP MOBILIZERS are looking for an answer to repeated revolts in minerals-producing countries against U.S. price policies. Bolivian tin producers walked out of a series of meetings on tin prices. They objected to the temporary price of $1.12 offered by RFC. Chile balked at the International Materials Conference allocation of copper, holding out 25,000 tons a quarter which it will sell to the highest bidder. Some of it has been reported going to West Germany at 57¢ per lb., compared to the 27½¢ U.S. consumers are allowed to pay for Chilean copper. Brazil refused to put itself under the $65 ceiling on tungsten concentrates as approved by IMC for the third quarter. Spot deals for Brazilian concentrates up to $80 a ton have been reported to IMC officials—with the result that other producer countries objected to extending the price agreement into the fourth quarter. Important Canadian zinc and lead producers withdrew from the U.S. market about Sept. 1. They did not resume shipments until Mobilizer Wilson personally ordered a 2¢ rise in U.S. ceilings on both metals Sept. 30.

Mobilizers fear that such incidents will increase if they can't get consumer and producer countries together on price agreements.

The U.S. view is that allocations—such as made by IMC for scarce minerals—are next to useless unless backed up by price agreements. It has instructed its IMC negotiators to insist that price be made part of any agreements, covering the first quarter of next year.

Brief, But Important

DUTY SUSPENSIONS—House bills to suspend duties on lead and zinc, in accordance with a request by Chief Mobilizer Charles Wilson, were blocked by objections in the Senate. The Senate will consider the bills when it meets next year.

FLUORSPAR CONTRACT—Government purchase, up to 100,000 tons of acid grade fluorspar for at least $60 per ton, was guaranteed in a contract between DMPA and Ozark-Mahoning Mining Co., Tulsa, Okla. The company will spend $1,400,000 in Colorado.

TUNGSTEN DUTY — Congress adjourned without a report from the Senate Finance Committee on a House bill to suspend tungsten import duties. The committee will take up the bill when it reconvenes.

GOLD RESTRICTIONS—U.S. is now the only country that has not given gold producers the advantage of an open market price, Sen. Pat McCarran told the Senate. He urged the Treasury Department to lift restrictions.

COPPER PRICE—OPS boss Mike DiSalle still turns thumbs down on an increase for copper. But he didn't expect—or approve—of the price rise ordered by Mobilizer Wilson for lead and zinc. He may not have the last word on copper, either. Manly Fleischmann, DPA administrator, puts it this way: The U.S. must either get more foreign copper by price increase or by having the Government act as sole buyer, as for tin.

ALLOCATIONS—Nickel and cobalt were put under allocation by the International Materials Conference. There was no price agreement.

MANGANESE DEPOT — Domestic manganese ore may now be shipped to a GSA depot at Butte, Montana, for inspection and purchase by the Government. Another depot is planned for Deming, N. M.

MRO RESTRICTION — The mining industry's authority to use DO ratings to obtain chemicals and reagents for operating purposes has been withdrawn by NPA. To correct misunderstandings in the industry, NPA also pointed out that the symbol DO-H-6 should be used in ordering grinding balls; H-6 is the proper symbol in ordering rings, liners and rods.

COBALT CEILING—OPS ended price controls on cobalt oxide in line with similar action taken earlier for cobalt ore and metal.

URANIUM REPORTS — Reports of the Geological Survey on uranium explorations, made for the Atomic Energy Commission, will be placed in open files for the benefit of any interested person. A list of these can be obtained from AEC, Washington 25, D. C.

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

MANPOWER NEEDS: Defense Minerals Administration has charted how much manpower is needed in each of the five years, 1951-55, to attain mineral mining production goals.

In production, manpower quotas rise each year: 74,930, 79,780, 82,860, 85,210 and 85,810.

In exploration, manpower needs taper off after next year: 5,720, 7,020, 1,960, 1,760, and 1,700.

Current employment is far behind what is needed — not much above last year's 68,200.

WHAT'S DMA DOING? DMA is worried, hopes industry will help arouse official Washington into some real action. Meanwhile, it's trying to help the situation in little ways:

Keeping miners out of military service. DMA has been effective in getting a deferment or delaying the call of a reserve officer. Sometimes it can release a reservist already in.

Combing applicants for government jobs. Some 1,100 mining men who had applied for positions in the government were asked by DMA if they would take mining jobs in private industry. Some 150 expressed an interest, were referred to mining companies.

Approving higher wages. If your wages are too low, DMA can help you get approval from the Wage Stabilization Board of higher wages —but not higher than other employers pay. Take a tungsten producer in Nevada. DMA got WSB to approve a boost in wage rates from $1.18 to $1.43. DMA showed that the tungsten mine only wanted to meet wages paid by other mines around.

Production Bonus? This same mine asked WSB to approve a bonus system for production workers. Decision withheld until a survey could be made on the bonus practices of other companies in the general area. DMA made the survey.

AS&R AND STEEL: WSB decided the final issue in dispute between AS&R and CIO steel workers at Garfield smelter. Recommendation that 3¼¢ an hour separate the rates paid in each of the 19 labor grades was accepted by both company and union. Union withdrew holiday pay demand and company agreed to raise its social insurance contribution 25¢ a month. There will be further bargaining on pensions.

WHO GOT MOST? The CIO settlement at AS&R consists of 8¢ in general increase and about 10¢ in correction of inequities through slotting of workers into the 19 labor grades, totaling 18¢. The rival Mine, Mill and Smelter Workers' settlement with Kennecott — yet to be approved by WSB—calls for the same 8¢ in general increase and only 7¢ more for correction of inequities, totaling 15¢. But Mine-Mill also got the equivalent of 4½¢ for pensions, making a "package" of 19½¢ an hour. The steel workers haven't settled on pensions yet. When they do, they should wind up with a bigger "package" than Mine-Mill got.

AS&R AND MINE MILL: When AS&R came to terms with Mine-Mill, this left-wing union had won settlements with three of the Big Four. The settlement, covering 13 AS&R properties, called for an 8¢ hourly increase, plus another 8½¢ for "fringes." This 16½¢ package compared with 19½¢ Mine-Mill got from Kennecott, 20½¢ from Phelps Dodge and American Zinc, and 21¢ from U.S. Metals. Mine-Mill anticipated comparable terms from Anaconda and, finally, dissolution of the Taft-Hartley injunction.

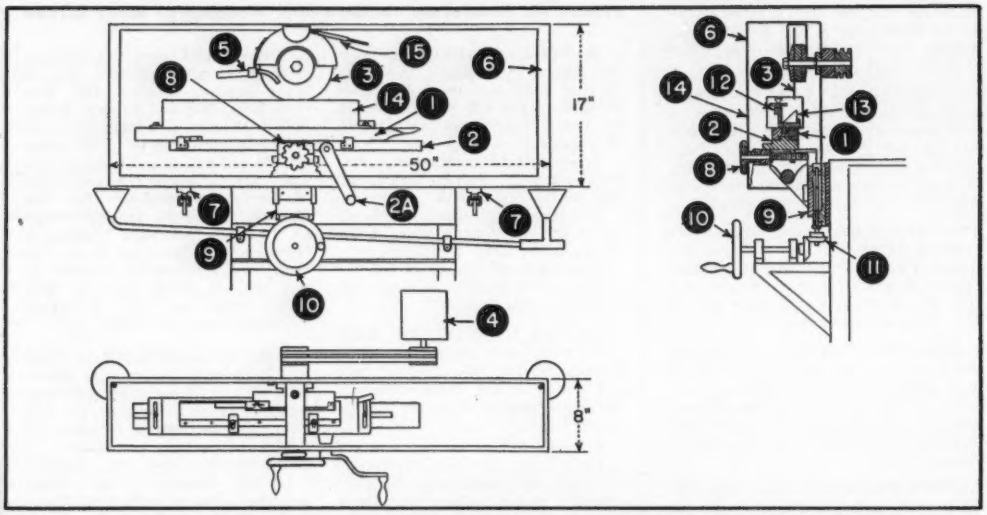
MINE-MILL PLEASED: Mine-Mill is tickled that AS&R — for first time—settled on a company-wide basis. Union considers this significant. Single, company-wide negotiations with each mining company is major Mine-Mill bargaining objective.

FUTURE TROUBLE: Non-contributory pensions like those in the automobile industry will be sought by Mine-Mill. The mining industry is convinced of this, and sees the demand for increased pensions as a source of trouble ahead. Wages, regulated by cost of living, will not be much of a problem.

UNION OFFICERS STAY: President John Clark and other incumbent Mine-Mill officers were assured of re-election in this month's referendum. No rank-and-file revolt is evident. Mining management should reconcile itself to dealing with present left-wing leadership in foreseeable future.

PER CAPITA INCREASE? Only real interest in the Mine-Mill referendum is whether members would approve per capita increase from 90¢ to $1. Mine-Mill headquarters wants the extra dime to finance an organizing drive in the Tri-State.

OPERATING IDEAS



Diamond Saw Splits Drill Cores Cleanly, Evenly

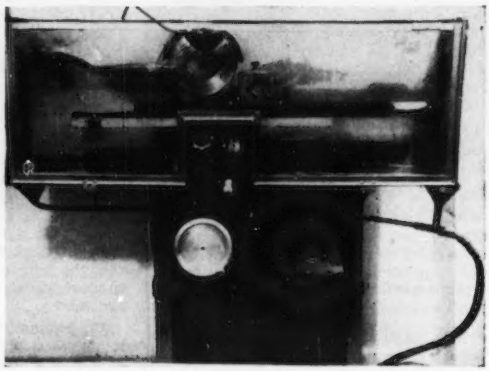
By R. S. YOUNG and R. SNADDON
Diamond Research Lab., Johannesburg, South Africa

IN THE MINERAL INDUSTRY, drill cores have usually been split into halves with a hammer and chisel. The half used for chemical analysis need not be in good condition; the other half, usually examined and filed for future reference, should be in good condition. The diamond saw illustrated above reduces the labor and cost of splitting, divides the cores more evenly, and leaves the filed half in better condition.

PARTS OF THE MACHINE:

1) **Movable platform** on which core holder is mounted.
2) **Slide** on which platform moves.
2A) **Crank** moves platform (by means of chain and sprocket) and thus feeds core into saw blade.
3) **Saw blade.** This machine allows diameter up to 8 in. with a ⅝-in. arbor.
4) **Electric motor,** 2-hp., driven by V-belts.
5) **Nozzle** directs strong jet of water on both sides of saw blade, cools blade and removes sludge.
6) **Aluminum framework** with hinged Perspex front (transparent), which stops water spray.
7) **Quick-release clamps** allow operator to lift Perspex front when mounting or removing cores.
8) **Adjustable slide** allows operator to move cores normal to saw blade (toward or from him).
9) **Slide** allows up or down movement of platform, is operated by
10) **Hand wheel,** through
11) **Bevel gears.**
12) **Brass clamping device,** bolted to platform. Plates and thumb screws (above) press downward on core.
13) **Triangular wooden block** prevents damage to saw blade.
14) **Trough,** used for drill cores, is removed as a unit when doing other diamond-saw work.
15) **Vacuum wiper blade** removes water from inside of Perspex front.

In photograph, clamp for cutting ends of drill cores.



In best practice, the saw blade should be run at 10,000 peripheral fpm.

For broken or friable cores, coat lightweight canvas with quick-drying lacquer and wrap tightly around core.

The machine is simple and flexible. Though designed for core splitting, it can also be used for a wide variety of other work.

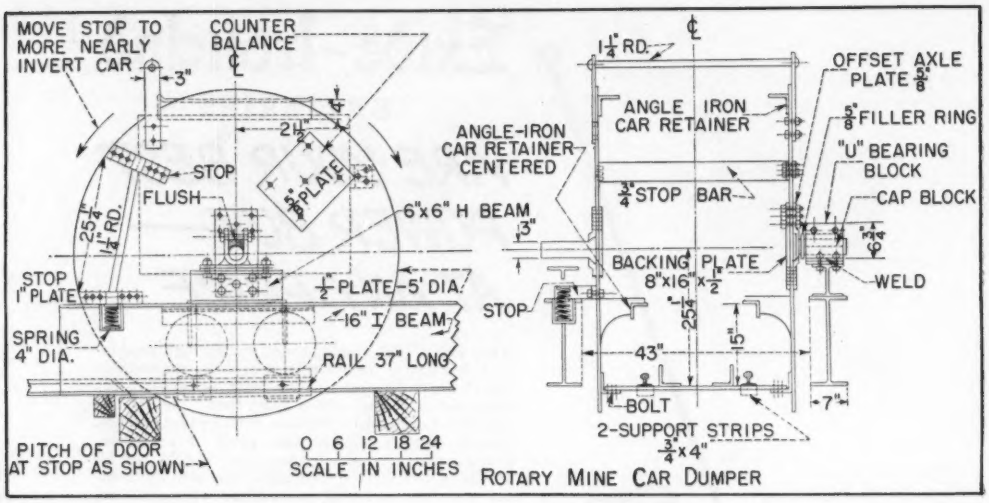
Exide-Ironclad
BATTERIES
ARE YOUR BEST POWER BUY— AT ANY PRICE

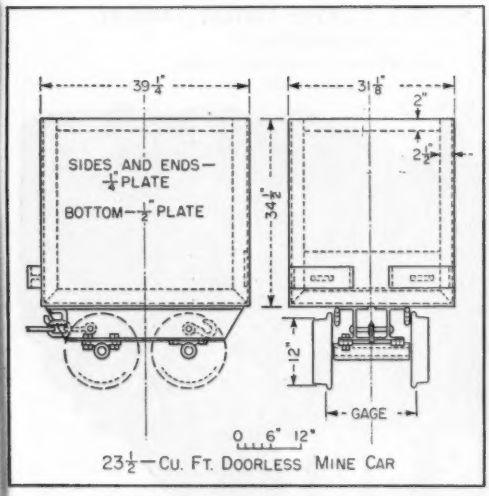
They PROVIDE ample power for fast, high-production haulage — more trips per shift, dependable round-the-clock performance, with no end-of-shift slowdown, no unscheduled down time . . . ASSURE inherent safety, with freedom from hazards of fire, fumes, noise . . . SHOW low costs of operation, maintenance, repair, depreciation. SIZES for all makes of battery-powered mine locomotives, trammers, shuttle cars. Call in an Exide representative, and let him prove these facts.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2

Exide Batteries of Canada, Limited, Toronto

"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*





Rotary Car Dumper Speeds Ore Removal

The doorless mine car and rotary car dumper shown here, submitted by John G. Hall, superintendent of Chief Consolidated Mining Co., Eureka, Utah, have resulted in these benefits since their adoption: (1) Elimination of dumping mechanism on old increased car capacity from 18 to 23½ cu. ft. (2) Increased hoisting capacity (cars are hoisted in cages). (3) Increased tramming capacity. (4) Elimination of spillage in haulage drifts. (5) Reduced car and maintenance costs.

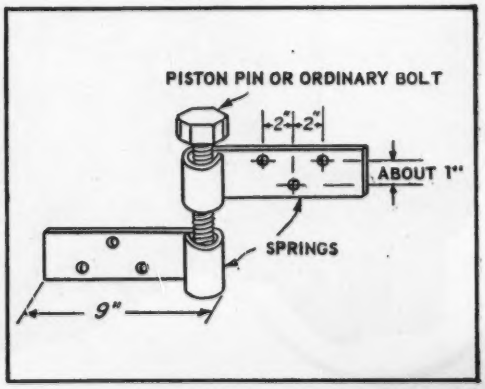
Accompanying drawings show how the old-type mine cars were rebuilt to eliminate dumping mechanism; also details of the rotary dump which operates by gravity. Appropriate stops in the rotary dumper retain the car within the dumper.

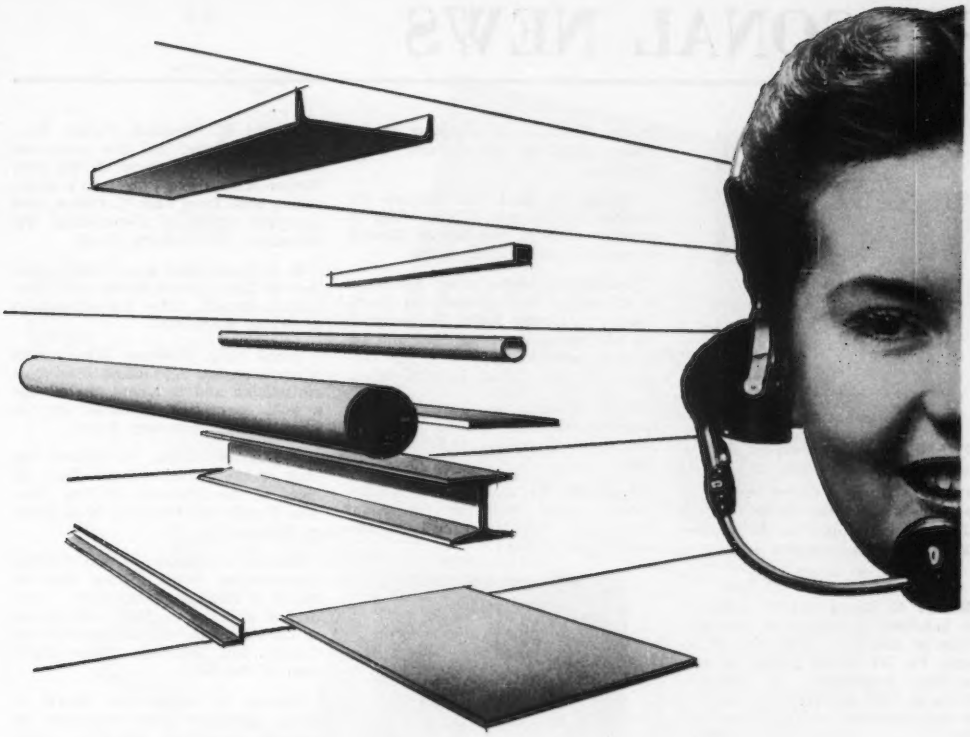
Mr. Hall reports that two of these car dumpers have been used for more than four years with very little maintenance. New shafts or axles are required about once a year. Mine shop mechanics rebuilt the cars and constructed the dumper.

How To Use Scrap Springs

Welding operators seldom cut up old or broken automobile springs to sell as scrap because this fine steel is too valuable. For instance, the curved main leaf of truck and automobile springs has an eye on each end for shackle connection. Consequently this part of scrap springs can be used to make a sturdy hinge for ventilation doors, etc. Here's how it is done: Cut the leaf about 9 in. from each end with an oxy-acetylene cutting blowpipe. Next, drill or cut three holes in each end piece for screws and bolts. These holes should be cut as shown in the sketch. Two ordinary bolts complete the assembly.

Remaining sections of the scrap spring can be used to make many handy tools for use in the shop, including wood scrapers, chisels, punches, etc. Idea presented through courtesy of Linde TIPS.





STEEL
for the Mining Industry

Contact us for all your steel requirements and extend Defense Order Ratings where they apply. Despite current shortages we will do our very best to supply you. And when we have the steel you are assured of prompt, personal service.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types including Inland 4-Way Safety Plate
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
ALLOYS—Hot rolled, cold finished, heat treated. Also tool steel
STAINLESS—Allegheny bars, plates, sheets, tubes, etc.
BABBITT—Five grades, also Ryertex plastic bearings
MACHINERY & TOOLS—For metal fabrication

Call RYERSON

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

PERSONAL NEWS

HOWARD I. YOUNG, president of American Zinc, Lead and Smelting Co. and the American Mining Congress, has been named deputy director of the DMPA. JULIAN FEISS, formerly assistant to the director, USBM, is now administrative assistant to Mr. Young

Robert M. Lloyd has been elected vice president in charge of raw materials of the U. S. Steel Co., Pittsburgh, Pa. Mr. Lloyd joined the raw materials department of Carnegie-Illinois in 1933 and became an assistant vice president of U. S. Steel this year.

Glenville A. Collins, consulting mining engineer of Santa Barbara, Calif., recently returned from the examination of mining properties on Roucher Deboulle Mountain, near Hazelton, B. C., Can., and from Lake City, Colo.

W. M. Gilchrist has been appointed manager of mines by Transcontinental Resources, with headquarters at Vancouver, B. C., Can.

James N. Sherwin has been elected a vice president of The M. A. Hanna Co., Cleveland, Ohio. Mr. Sherwin was formerly vice president of the Hanna Coal and Ore Corp.

Dr. W. M. Fiedler, assistant chief geologist for Jones & Laughlin Steel Corp., Pittsburgh, Pa., has been appointed chief geologist, succeeding **L. P. Barrett,** now geological consultant to the vice president. **J. P. McKee** is Dr. Fiedler's new assistant.

J. D. McAuliffe, formerly with Falconbridge Nickel Mines, Ltd., is now with The M. A. Hanna Co. at Iron River, Mich., as general operating engineer.

G. A. Engel succeeds the late **Oscar W. Cole** as purchasing agent for the Oliver Iron Mining Co., Duluth, Minn.

Formerly with the mining department of Inspiration Copper Mining Co., Inspiration, Ariz., **Juel G. Droubay** has joined the mining department of Anaconda Copper Mining Co., Butte, Mont., as a shiftboss at the Kelley Shaft of the Greater Butte Project.

Charles D. Kerr will assume the position of the late **W. H. Webb** as superintendent of the Mesabi Mineral Association at Hibbing, Minn.

Roland I. Erickson is now professor of mining at the University of North Dakota in Grand Forks. He resigned his position as chief engineer and assistant suprintendent with the Reserve Mining Co. at Babbitt, Minn.

R. S. Douglas has been appointed assistant general manager of Canadian Exploration, Ltd., at Salmo, B. C., Can.

James M. McCutcheon has been appointed chief engineer for Giant Yellowknife Gold Mines, Ltd., Yellowknife, N.W.T., Can.

DR. JAMES BOYD resigned as director of the U. S. Bureau of Mines to join Kennecott Copper Corp.'s executive staff. During World War II, Major Boyd served on the Requirements Committee of the WPB. Later he became assistant to General Lucius D. Clay, and when General Clay established his command in Europe, Dr. Boyd, by then a full colonel, was appointed director of industry. Again a civilian in 1946, Dr. Boyd became dean of faculty at Colorado School of Mines, leaving to become assistant to the Secretary of the Interior in 1947. Shortly thereafter he was appointed director of the USBM.

C. E. McManus of The M. A. Hanna Co., assistant to the general manager of the Minnesota mines, has been appointed mines manager for the Iron Ore Company of Canada in charge of mining operations in Labrador. **B. M. Andreas,** superintendent of the Cooley district iron mines, is now general superintendent of Hanna operations on the Mesabi Range. R. C. Wallace will replace Mr. Andreas in the Cooley district.

Dwight H. Plackard, Dallas, Tex., has been made the new executive secretary and treasurer of the New Mexico Miners and Prospectors Assn., taking over from **Jack C. Pierce,** now assistant editor of *Compressed Air Magazine,* Phillipsburg, N. J.

R. B. Buckerfield was elected president of Giant Mascot Mines, Ltd., Vancouver, Canada, after the resignation of **W. G. Mackenzie.**

Frank Lilly, Spokane, Wash., mine statistician, has been asked to serve as statistician and technical adviser for a gold committee appointed by the International Monetary Fund.

Robert W. Hume has joined the staff of the Cerro de Pasco Corp. as chief of the Diamond Drilling Division. Family residence will be at Cerro de Pasco, Peru.

Donald M. Nelson, of the Caribou Consolidated Silver Mines, was recently at Boulder on business in connection with the company's operations at Caribou and Nederland in Boulder County. Mr. Nelson is former chairman of the WPA.

Delmer L. Powers and **David L. Evans** announce their association as general consulting geologists under the firm name of Powers and Evans. Address: 307 Kaufman Building, Wichita, Kans.

Leaving his position as mine superintendent for Indian Copper Corp., Ltd., **H. C. Herbert** will assume the responsibilities of head of the studies department of Beralt Tin & Wolfram, Ltd., Fundao, Portugal.

WILLIAM GRUENERWALD has announced the opening of his offices as consulting geologist located in the Pure Oil Building, 35 East Wacker Drive, Chicago, Ill. Mr. Gruenerwald was formerly with the Paul Weir engineering company, Chicago.

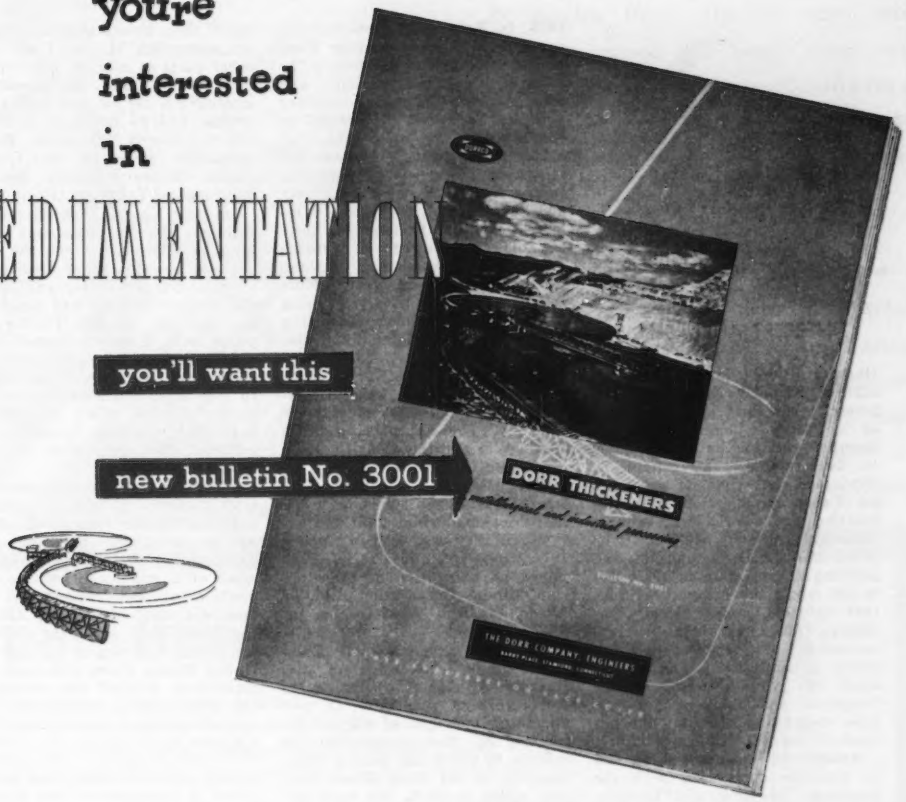
H. F. Mills, formerly general superintendent of American Zinc, Lead & Smelting Co.'s operations at Metaline

if you're interested in

SEDIMENTATION

you'll want this

new bulletin No. 3001



Better Tools TODAY... to meet tomorrow's demand.

Bulletin #3001, "Dorr Thickeners for chemical, metallurgical and industrial processing" has just come off the press. Containing 28 pages of descriptions, drawings and photographs, it covers the comprehensive line of Dorr Thickeners briefly and factually. If you're concerned with thickening problems and the equipment with which to solve them, you'll find it helpful. Write for your free copy today.

DORRCO

DORR

WORLD - WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

Offices, Associated Companies or Representatives in the principal cities of the world

E & M J Salute for Outstanding Service

HERBERT A. KURSELL

Herbert Kursell is one of those rarities properly called a "mine finder." This does not mean that as a geologist, engineer, adventurer, negotiator or businessman, he has talents that cannot be duplicated, but that he possesses all of these qualifications in a combination that works with almost uncanny success. Kursell, who joined the American Smelting and Refining organization in 1925, has to his credit the bringing of several valuable mines to his employers, the latest being several promising porphyry copper deposits in south Peru. The exploration of two of these, namely Toquepala and Quallaveco, is now near completion after an expenditure of several million dollars.

Retirement age has put an end to Kursell's connection with the American Smelting and Refining Co., and he is now embarking upon private consulting practice, his chief hobby remaining the finding and making of mines. His home is in Scarsdale, N. Y.

Kursell was born on Sept. 16, 1886, in Estonia of Scandinavian ancestry. Upon graduating from high school in St. Petersburg, he enlisted in a cavalry regiment and after completing his military training he dedicated himself to the study of mining engineering. Majoring in geology, he was admitted to the degrees of mining engineer, metallurgical engineer and mine surveyor by the Mining Academy of Freidberg in Saxony. There followed post graduate courses in France and Belgium. During his student years, Kursell traveled extensively, visiting mines in all of Europe including Spain, Norway, Finland and Rumania.

From 1911 to 1914 Kursell led a field expedition for a Belgian company prospecting for minerals in Katanga. The approaching First World War and the order to rejoin his regiment terminated this activity. However, infections contracted during the strenuous work in Africa made him unfit for active military service in March 1914, and upon his release, he joined an expedition of the Russian Mining Corporation, Ltd. of London to the Altai region of Siberia.

Kursell became manager of the Zmeinogorsk Concession of the Russian Mining Corporation in April, 1915. A year later, he was appointed manager of all the interests of the corporation in Siberia, to which the general managership of the Altai Mines, Ltd. was added in 1916. His work involved the exploration of extensive mining concessions and the development of numerous rich and large ore deposits, besides the routine operation of a small gold mine. Kursell was also repeatedly called upon to examine and report on properties in the Urals and other parts of Siberia. The revolution of 1917 and the spread of communism set an end to his activities and he left Asia in 1919. There followed two years of examination work in the United States, Northern Canada, Mexico, and repeated European trips.

In 1923 Kursell took charge as manager of the Botanamo gold mine in Venezuela. Upon the successful development of that property, he left Venezuela and joined the Federal Mining and Smelting Co. in Idaho in 1925. During the years with Federal, Kursell was concerned with the exploration and development of the Page mine. In 1926 he visited Australia for the account of the AS&R Co. and at that time reported favorably regarding the acquisition of the Mount Isa Mines.

In 1928 Kursell was transferred with the title of resident mining engineer to the New York office of the American Smelting and Refining Co., the title being somewhat of a misnomer because the position involved frequent and extensive travels in Europe, Africa, the Near East, Canada, Central and South America, as well as the United States. From 1928 until his retirement, Kursell was active in the development, acquisition, and operation of such properties as The Neptune Gold Mining Co., Quiruvilca, and Corocoro, as well as other mining ventures abroad and in the U.S.A. A large part of 1942 Kursell spent in Brazil on an investigation of the Goyas nickel deposit. From that year onward most of his time was given to the exploration and development of the Peruvian porphyry coppers mentioned above.

Falls, Wash., was promoted to northwest exploration engineer, with headquarters in Metaline Falls. Expanding search for metals in the Northwest created the position. **John W. Curry** will succeed Mr. Mills, and **Claude Sage** will step into Mr. Curry's place as mine superintendent. **Otis Hagbarg** is now mine foreman.

F. G. Snyder has left the University of Tennessee geology department and joined the geological staff of the St. Joseph Lead Co., Bonne Terre, Mo.

Formerly with Falconbridge Nickel Mines, Ltd., Sudbury, Ontario, Can., **Robert G. Fountain**, civil engineer, is now on Cleveland-Cliffs Iron Co.'s engineering staff at Ishpeming, Mich.

Fred Howell, chief geologist at Federal Mining and Smelting Co.'s Page mine, has resigned to accept employment with Climax Molybdenum Co. at Climax, Colo.

R. C. Hart has been promoted from chief geologist to general superintendent of Preston East Dome Mines, Ltd., near Timmins, Ontario, Can. He is succeeded by **Dan Firth.**

Ex-president Herbert Hoover has been awarded the Howard Coonley Medal for long and outstanding service in advancing the national economy through voluntary standards. The award was presented by the American Standards Assn., which makes the award annually, at the closing session of the three-day National Standardization Conference in New York, N. Y.

Harold S. Worcester has resigned as assistant general manager of Golden Cycle Corp. to participate in a mining partnership, the operations of which will center in the Montrose, Colo., area.

R. Sholto Douglas has been appointed mill superintendent for Acoje Mining Co. at the chromite property in Santa Cruz, Zambales, Philippines. Mr. Douglas has recently served as metallurgical adviser to Saudi Arabia.

Dr. D. S. Turner, formerly assistant professor of geology in mineral deposits and mining engineering at the University of Wyoming, is now research geologist with the Carter Oil Co., Tulsa, Okla.

E. W. Vanstone, secretary-treasurer

why change it ?

At Boyles Bros. there's only one reason for modifying any diamond drill design—and every drill runner knows it! That reason is *increased usefulness.*

the simple fact is...

We're not out to win industrial fashion awards with a line of fancy models. We ARE out to combine maximum performance—maximum flexibility with minimum weight—at minimum cost per foot.

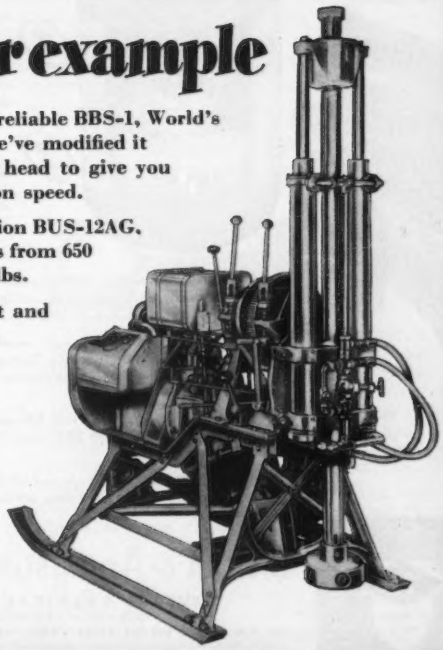
take this drill, for example

It's no showroom "dream job",—just the old reliable BBS-1, World's best known surface diamond drill. But now we've modified it for use with a light twin-cylinder hydraulic head to give you better feed control with increased penetration speed.

With this new 12AH Swivelhead or its companion BUS-12AG, you get heavy drill performance with "A" rods from 650 to 800 feet. Total weight, as illustrated, 1469 lbs.

This model also handles "B" rods to 550 feet and can be fitted with hydraulic self-centering chuck for seismic shot drilling.

P.S. For your "E" program, BBS-1 with BUS-1 Swivelhead is still setting performance standards in all types of formations throughout the world.



WE LOOK INTO THE EARTH

BOYLES BROS
DRILLING COMPANY LTD.
VANCOUVER, CANADA

of the Macassa Mines, Ltd., of Toronto, Canada, has been elected to membership in the Controllers Institute, a non-profit organization of controllers and finance officers from all lines of business.

George D. Bellows has been appointed senior engineer with J. G. White Engineering Corporation of New York. Mr. Bellows is stationed at Djakarta, Java, Indonesia, as mining consultant to the Indonesian Government.

Frank H. Hayes, Jr., acting director of the Copper Division. NPA, Washington, D. C., has been made director. Mr. Hayes, a member of the AIME and a consulting engineer, has been in government work since World War II. **Erwin Vogelsang,** former deputy director of the Tin, Lead and Zinc Division, has been made director. He is also a member of AIME and an independent metals broker.

Formerly a mine electrician with Phelps Dodge, **E. L. Webber** is now holding the same position with International Minerals and Chemical Corp., Carlsbad, N. M.

Clifford B. Anderson has left The Montreal Mining Co. as a mining engineer to accept a position as mine foreman and assistant superintendent for American Asphalt Assn., Jensen, Utah.

Don Redman is now with the Zonolite Co. at Libby, Mont., as pit engineer, the position he held previously for Homestake Mining Co.

S. H. Reed, Jr., formerly general mine foreman at Chihuahua, Mex., is now at Cia. Minera Nacional S. A. Taxco Unit, Gro., Mex., as mine superintendent.

Fred J. Hoff has left his position as research engineer for I.M.C.C. in Florida to join Lepanto Consolidated Mining Co., Mankayan, Philippines, as mill superintendent at Lepanto Consolidated Mining Co.

Allen H. Engelhardt has assumed the post of manager of operations of the Cerro de Pasco Corp., and will be in charge of the corporation's mining, smelting, and refining operations in the Republic of Peru. **John W. Hanley,** superintendent of smelters and refineries since 1949, has been appointed assistant manager of operations, succeeding Mr. Engelhardt.

Walter I. Garms, assistant general manager of Kennecott Copper Corp., at Hayden, Ariz., has retired. Mr. Garms has served at Hayden since 1910 as mill foreman, mill superintendent, and assistant general manager.

J. R. Bryce, Jr., formerly with Idarado Mining Co., is now mill superintendent at Compañia Minera del Peru, Puno, Peru, a subsidiary of Mauricio Hoschild.

Dr. T. A. Rickard, geologist, writer, and editor-emeritus of *E&MJ*, *The Mining Magazine* and *Mining and Scientific Press*, marked his 87th birthday in Victoria, B. C., Can., his home since 1932. Dr. Rickard is presently writing a history of British Columbia.

Rollin P. Smith of the South Amboy plant of Titanium Metals Corp. has been appointed project manager of the new works at Henderson, Nev.

T. P. Billings has succeeded **Otto Herres,** who returned to Combined Metals Reduction Co. in July, as chief of the Lead-Zinc Division, DMA.

Charles M. Cooley, assistant chief engineer at the Climax Mine of the Climax Molybdenum Co. has resigned to take a position as assistant editor of *Mining Engineering*, New York, N. Y.

Obituaries

William H. Wright, who made the first gold discovery in Kirkland Lake in 1911, died at his home in Barrie, Ontario, at 75. Born in England, Mr. Wright went to Canada at the close of service in the Boer War in 1902. In one of the century's outstanding "rags-to-riches" careers, he became a prospector and struck it rich when

3 reasons why
you should specify B&A reagents!

1 **WIDE SELECTION...** B&A has over 1,000 laboratory chemicals for you to choose from.

2 **HIGHEST PURITY...** always meet or exceed A.C.S. specifications.

3 **READILY AVAILABLE...** from B&A's own well-stocked distributing stations situated in key centers everywhere.

B&A SAVES YOU *time, money, effort in your laboratory chemical buying.* When you specify B&A, you can choose from more than 1,000 purity products of Reagent, A.C.S., C.P., U.S.P., N.F., and Technical grades.

THE BAKER & ADAMSON LABEL *is your assurance of the highest purity.* Reagent chemicals that bear the B&A "Shield of Quality" *always meet or exceed A.C.S. specifications* . . . the exacting purity standards set by the chemical profession itself!

YOU GET *prompt and efficient service.* Extensive stocks of "B&A Quality" products are supplied through B&A's own chain of distributing stations located from coast to coast.

Contact the B&A office nearest you and tell them your needs. Your B&A salesman will work with you in having our local stocks built to meet your requirements.

REAGENTS B&A STANDARD OF PURITY FINE CHEMICALS

BAKER & ADAMSON *Reagents*
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Offices: Albany • Atlanta • Baltimore* • Birmingham* • Boston • Bridgeport* • Buffalo* Charlotte* • Chicago* • Cleveland* • Denver* • Detroit* • Greenville (Miss.) • Houston* Jacksonville • Kalamazoo • Los Angeles* • Minneapolis • New York* • Philadelphia* Pittsburgh* • Providence* • St. Louis* • San Francisco* • Seattle • Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*
SETTING THE PACE IN CHEMICAL PURITY SINCE 1882
* Complete stocks are carried here.

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oils

UNIT Caterpillar D13000 diesel

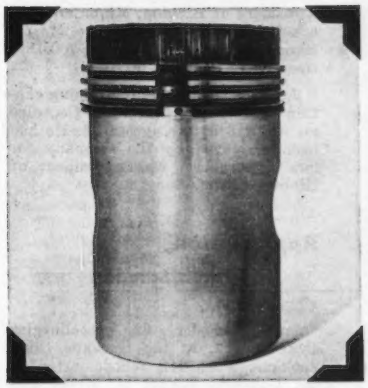
OPERATION Operating 75 KW generator

CONDITIONS Constant speed — varied loads + temp.

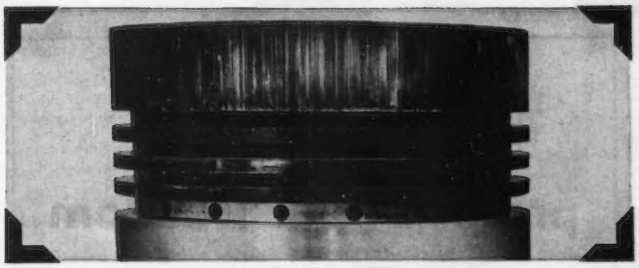
PERIOD 2119 hours

FIRM Lusitania, San Diego, Calif.

Ring-sticking stopped, wear cut in heavy-duty engine



AFTER 2119 HOURS on RPM DELO Supercharged-2 Lubricating Oil, this representative piston from a D13000 Caterpillar indicates the clean condition of lubricated parts of the engine. All 24 rings in the engine were free!



ONLY 0.0002 INCH WEAR PER THOUSAND HOURS was the average wear-rate on cylinders in the engine during the 2119-hour run, although usual drain periods were extended to 1000 hours. Oil temperatures averaged 175° F. to 180° F. Note the open oil-return holes and grooves (above) and lacquer-free piston skirt (left).

CYLINDER HEAD from the engine after the run. RPM DELO Supercharged-2 is recommended specially for heavy-duty engines where fuel-scoting or other deposits, high temperatures or other conditions cause operational problems and wear.

How RPM DELO Oils keep engines clean and prevent wear

A. Contain special additives that provide metal-adhesion qualities...keep oil on parts whether they are hot or cold, running or idle.

B. Anti-oxident resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.

C. Special compounds stop corrosion of any bearing metal, and oil foaming in both wet and dry sump engines.

There is an RPM DELO Oil to meet every heavy-duty engine operation condition.

FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.

RPM DELO LUBRICATING OILS

TRADEMARKS "RPM DELO" REG. U.S. PAT. OFF.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

he staked much of the ground that became the Lake Shore and Wright-Hargreaves mines. He became vice president of both companies. His principal other business interest was ownership of one of Canada's great newspapers, *The Toronto Globe and Mail.*

Ralph H. McLoughlin, 61, Piedmont, Calif., mining engineer, was killed in an automobile accident at Bonners Ferry, Idaho, Aug. 17. Mr. McLoughlin had offices in San Francisco, following his return from internment in Santo Tomas Prison in the Philippines during World War II, where he had been connected with a mining firm.

W. A. Odgers has passed away at the age of 44. Mr. Odgers was general manager of the Northern Rhodesian interests and a director of a number of the companies of the Free State gold mines of the Anglo American group in South Africa at the time of his death. He was formerly responsible for the planning and development of the group, which progressed rapidly under his leadership.

William N. Rossberg, 71, former general manager and chief mining engineer of the Montana interests of former U. S. senator and mining magnate, W. A. Clark, passed away at his residence in West Los Angeles, Calif., on Sept. 16. Mr. Rossberg, a graduate of Columbia University, was one of the prominent pioneers in the flotation process.

John Eck, 48, assistant mine superintendent at Pulacayo, Bolivia, at Cia. Huanchaca de Bolivia, died at his home in Pulacayo on Sept. 24. He had formerly been employed as mine foreman for U. S. Vanadium Corp. at Pine Creek, Colo., and was a member of the AIME.

J. M. Fitzpatrick, Butte, Mont., for many years chief clerk of the mines office of the Anaconda Copper Mining Co., died at his residence on Sept. 4.

William Harry Webb, 68, fee superintendent for the Mesabi Mineral Association, died on Aug. 24 in Duluth after a short illness. Mr. Webb was a resident of Hibbing, Minn., and had a wide acquaintance on the Mesabi Range, having been with the Association for 51 years.

James R. Fayle, retired mining captain of Pickands Mather & Co., died on Aug. 16 at the age of 78. He had been employed by the company for many years and was a resident of Hibbing, Minn.

STEEL

protects your freedom

NO SCRAP-NO STEEL

sell your scrap now

every pound counts

THE CALIFORNIA WIRE CLOTH CORP., OAKLAND
THE COLORADO FUEL & IRON CORP., DENVER
WICKWIRE SPENCER STEEL DIVISION, NEW YORK

CF&I STEEL PRODUCTS SINCE 1872

THE COLORADO FUEL AND IRON CORPORATION CF&I

Appreciation

Jacob Schoder

Editor's Note:

Jacob Schoder, 62, metallurgist died Sept. 1, at the Spokane Club, Spokane, Wash. Mr. Schoder attended the Colorado School of Mines and worked in Argentina for St. Joseph Lead Co. Thereafter he became associated with Frank Eichelberger, Spokane mining engineer, and the author of this appreciation:

To everyone who knew Jacob Schoder, he was always "Jake"—a quiet, unassuming person who kept buried beneath a quiet exterior one of the most fertile, active brains that it has ever been my pleasure to run across. He was a great friend—a great pal—a great associate, and this country is full of the ideas that Jake put into concrete, machinery, stone, and wood.

He and I built 16 plants together during the 20 years we were associated and in every one there was some fine idea or invention of Jake's. He not only was a good metallurgist, but he had an outstanding mechanical brain, and anyone who ever had the pleasure of watching his cathode stripper work, could not fail to note that he was in the presence of a genius.

From Canada to the Argentine, Jake's handiwork is scattered over the Northern and Southern Hemispheres. Those of us who are left to mourn him will always miss his quiet, ever-cheerful presence, sound advice, and great ability.

FRANK EICHELBERGER

Facts About Those Famous Old Hand-Drilling Contests

(Continued from page 85)

record as a driller. You also asked for a snapshot of myself, and about the contest of which I was the most proud.

The first time that I drilled was on Railroad Day, the day the railroad got into Tonopah, and I got first money, $230.00. Then one of the mine owners, either Brougher or Butler, added another hundred to the purse, which made it the largest purse that I had ever won.

The same amount was added to the double-hand purse. I believe that Butler added it to the single-hand purse and Brougher to the double-hand purse.

The deepest hole that I drilled was at Rhyolite, July 4, 1907, 25⅞ in.

I am sending under separate cover a picture of Fred Yockey which he gave me at Goldfield about 1906. I am also sending a picture taken at Tonopah, July 4, 1909, which I have always considered to be the best picture I have seen of a hammersman caught in action.

The fellow with the hammer is none other than myself and my partner was Fred Sander.

The paper of July 5, 1909, said Sander and Richie got second money with 40½ in. Richie drilled a few minutes afterwards and got first in the single-hand contest.

About myself, I will probably be 71 years' old by the time you get this out. I am so full of Tonopah dust that I could not run a hundred yards to save my life, but by taking it easy I do a lot of trout fishing, and year before last I got both a deer and an elk.

In the article I sent in and which you asked for the records I had made and the other information, I forgot to mention something in the contest won by Chamberlain and Make in El Paso. An old Swede who followed the drillers around and sharpened steel for a number of them put two bottles of beer in the water which was used to keep the hole clean. He said the foaming of the beer in the hole would bring the drillings to the surface faster, and keep the hole cleaner. A practical demonstration of flotation I would say. If any man in the world could get all there was in a man out of him, this old Swede was that man.

He was helping Ed Malley, who got first money on Railroad Day in Tonopah and we called the "boy wonder." He was drilling with Chamberlain when he was about 18 years old, I believe, and he said, "Now, Ed, get oop and hit him yust som hard and yust som fast som you can."

Will say that I am growing oranges here in Rialto and expect to die here, unless I fall down exhausted on one of my deer hunts in Wyoming.

ATHA ALBERT RICHIE

VICTAULIC...
Superior Piping for 27 Years

The Victaulic Method is the complete piping method. The name Victaulic stands for pioneered leadership in quick, dependable piping construction.

Here are the facts — just what the Victaulic Method is... why it's the EASIEST WAY TO MAKE ENDS MEET —

First — it's simple and fast — combines ease of application and ease of assembly.

Second — it's flexible and sure — can be used for irregular laying contours, yet it assures positive-locked, leak-proof joints even under extreme pressure, vacuum, or strain conditions.

Third — the name VICTAULIC represents a COMPLETE LINE of modern Full-Flow Elbows, Tees and other Fittings that provide unique versatility in a piping system.

Fourth — easy-to-use, portable Vic-Groover tools prepare pipe ends twice as fast and with half the effort of a conventional pipe threader.

Try the Victaulic Method on *your* next piping job — new construction, repairs, or alterations — you'll be sure to save time, work, and money!

Make that next job ALL VICTAULIC! Write today for Victaulic Catalog and Engineering Manual No. 44-8C.

NOTE VIC'S NEW COMBINED MAIN OFFICE AND PLANT ADDRESS BELOW—

Sizes—¾" through 60"

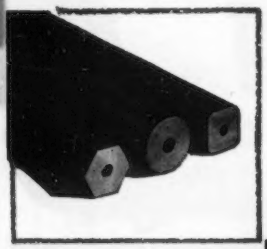
VICTAULIC COMPANY OF AMERICA
1100 Morris Avenue, Union, N. J.
Mailing Address: Box 509, Elizabeth, N. J.
Phone: Elizabeth 4-2141
Victaulic Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 406 Hopewell Ave., Toronto 10
For Export outside U.S. & Canada: PIPECO Couplings & Fittings, Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N.Y.

27TH VICTAULIC YEAR

The easiest way to make ends meet
VICTAULIC
PIPE COUPLINGS AND FITTINGS

Copyright 1951, by Victaulic Co. of America

DRILLING OUT HARD ROCK ANOTHER JOB for HOLLOW DRILL STEEL



When you're up against a tough, hard-rock drilling operation, set up your drills with Crucible Hollow Drill Steel. This quality steel is built to take the punishment of around-the-clock operation of modern, high air-pressure rock drills. And you have the assurance of minimum breakage . . . and an end to loss of expensive bits.

That's because *every* lot of Crucible Hollow Drill Steel is *pre-tested* before it gets to you. What's more, Crucible Hollow Drill Steel is backed by the experience of engineers and metallurgists who are drill steel specialists. They work right on the job with you . . . if you need them.

You get all these extras when you do business with Crucible. Our metallurgists and drill steel experts can help you with these "special" jobs that take something different in drill steels. CRUCIBLE STEEL COMPANY OF AMERICA, General Sales and Operating Offices, Oliver Building, Pittsburgh, Pennsylvania.

CRUCIBLE first name in special purpose steels

51 *years of* *Fine* *steelmaking*

HOLLOW DRILL STEEL

HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

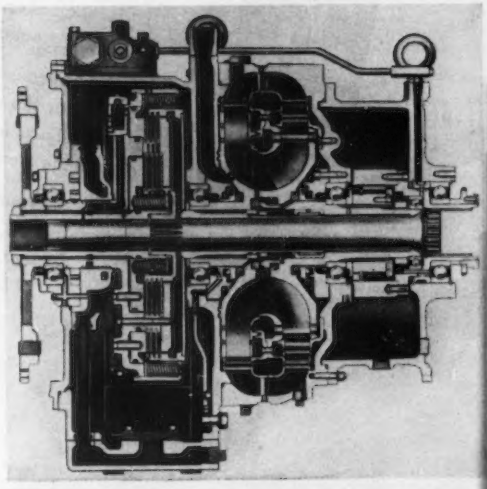
E & M J

NEW PRODUCTS DIGEST

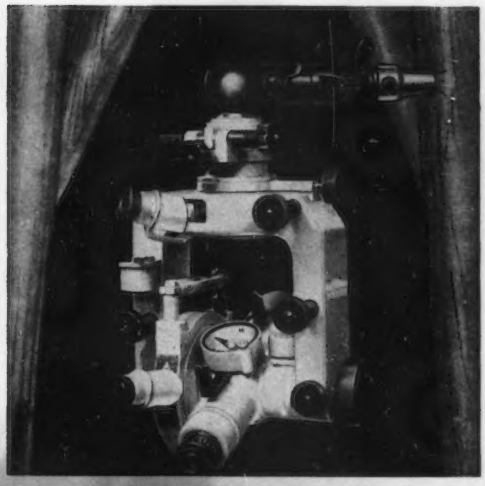
For further information on these products, please use numbers on reply card and mail.

FEATURES

Three-Stage Torque Converter



DEVELOPMENT of a three-stage hydraulic torque converter transmission which eliminates 99% of forward gear shifting on the toughest grades—and which, combined with engine drag, can perform 90% of the braking—is announced by the Twin Disc Clutch Co., Racine, Wis. The new unit, called the Model DF Direct Drive Hydraulic Torque Converter, has been subjected to rugged tests on the Mesabi Iron Range. Used with closely-spaced transmission, the converter provides a smooth and efficient use of power for trucks which haul loads up to 30 tons on grades up to 13%. Hauling cycles have been significantly reduced in field tests, with substantial savings on axles, tires, gears, and brakes. In one of the field tests with a Dart truck the new converter was used in front of the closely-spaced five-speed transmission and correct rear axle final drive gear ratio. For more details on the converter and the test results, circle (1) on the reply card opposite p. 126.



A Special Transit for Mine Engineers

MINING ENGINEERS who have to run surveys in narrows, drifts, raises, stopes, and other tight spots will find much of interest in this new suspension transit made by the Breithaupt Co. of Germany. The transit is suspended from steel pegs driven into rock or timber as shown. Where space is no problem, the same transit can be used on a standard tripod. Horizontal and vertical circles with a diameter of 2¾ in., have a reading accuracy of 1 min. The telescope has a 30-mm. apperture and 25 X magnification. The transit is fully enclosed and dust proof. Construction of the unit is said to give the instrument greater precision and reliability in the presence of iron or electrical fields. The suspension transit is available through Breithaupt's exclusive representative, Columbia Technical Corp., New York 22, N. Y. (2)

STANDS WEAR AND TEAR
... with strength to spare

QUAKER HOSE

Used in Leading Mines Throughout the Nation

FOR MORE PRODUCTION . . . GET THIS BOOK

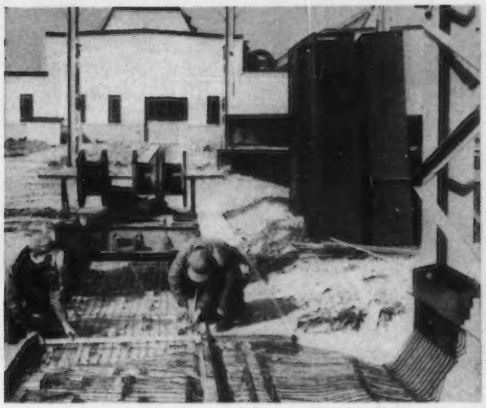
. . . and the entire QUAKER Conservation Maintenance Plan — includes maintenance memos, wall chart, factual data to help you reduce maintenance. No charge . . . no obligation.

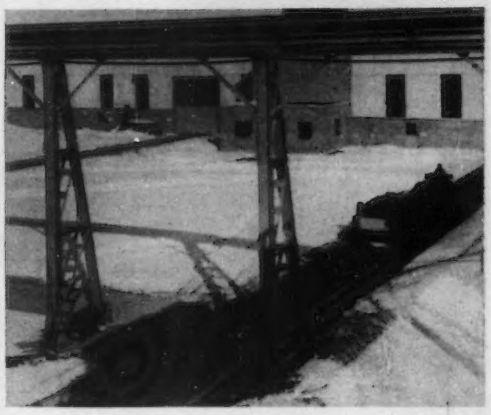
Whether you need hose for pneumatic tools, rock drills, suction pumps, steam shovels, stripping work, or some other type of service, Quaker has the hose that will do the job better, longer, and with greater economy.

That is because each type of Quaker hose is specially engineered for the severe service encountered on the job. It withstands abuse, shock-blows, twisting, abrasion, and exposure to oil and the elements.

Whatever your hose operation . . . or your requirement for conveyor belting, transmission belting, or packing . . . see your Quaker representative. He will recommend the *right* type of product for the job. Write for the new Quaker General Catalog—#751-EM.

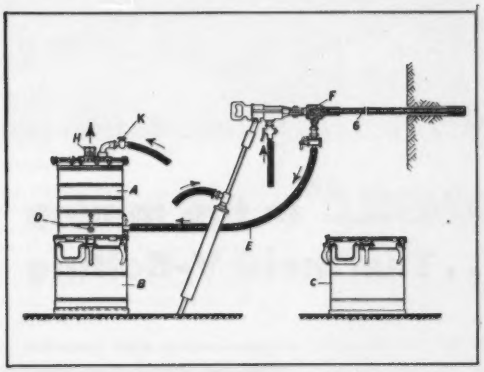
QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
PHILADELPHIA 24, PENNA. BRANCHES IN PRINCIPAL CITIES





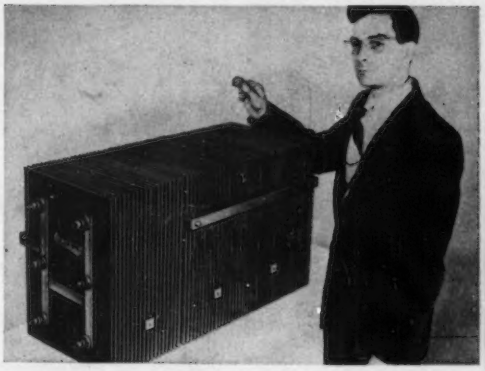
NO MORE SNOW SHOVELING.

Workmen, above, placed more than 40,000 ft. of General Electric flexible, lead-covered heating cable in concrete crane and transport runways of the Bucyrus-Erie Co. plant, South Milwaukee, Wis. View at right shows how effective this installation was in keeping these runways free from snow and ice. Runways were 100 to 275 ft. long, and 10 ft. wide. For more information, use card. Circle (3)



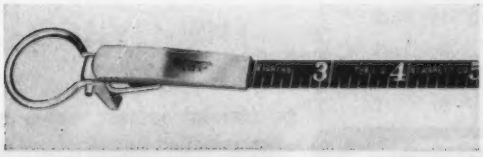
DRILL DUST EXHAUSTER.

Columbia Technical Corp., New York 22, N. Y. announces the Konigsborn drilling dust exhauster shown here. Essential parts are: (A) air filter and injector, (B) storage tank, (C) spare storage tank, (D) connector, (E) suction hose, and (F) adapter. Compressed air is fed through valve (K) into the injector (A) which produces a strong vacuum. Dust-laden air is drawn out through the hollow drill steel (G). Filtered air emerges at (H). (4)



SELENIUM RECTIFIER.

Syntron Co., Homer City, Pa. announces the availability of new custom-made ac to dc rectifier power conversion units of high current and voltage capacities. This new development is made possible by the manufacture of extra large selenium rectifier cells by Syntron's new vacuum process. The new rectifiers are designed for vibratory feeders, grizzlies, bin vibrators, electro-magnetic hammers and other dc equipment. Cells are available in 16 sizes. (5)

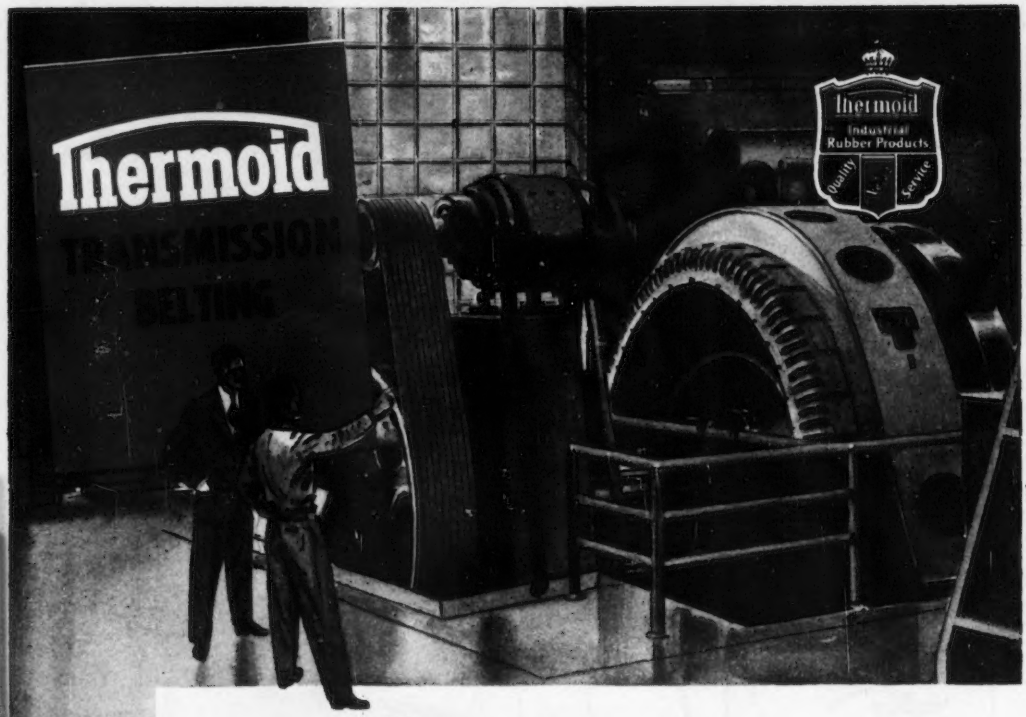


HANDY TAPE HOOK.

This detachable tape hook eliminates the need of a helper for measuring long pipe, sheets, lumber, etc. It is made by L. S. Starrett Co., Athol, Mass. Will fit on any Starrett ¼ or ⅜-in. steel tape. (6)

AIR LINE FILTER.

Oil and water are removed from compressed air lines with this "Airlenco" condensing filter. Fiberglas cartridge baffles out moisture. Moisture also condenses and drops. Made by Air-Line Engine Ring Co., Cleveland (7)



For the "BIG WHEELS" in the mining industry it's . . . Thermoid V-Belting

FREE . . .
Write for free catalog No. 3678. Contains authentic data on how to choose Multi-V F.H.P. or flat transmission belting.

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and ability to absorb repeated shock loads . . . thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets — uniform in size and cross section. Their longer life and non-slip performance add up to "Power—at the lowest cost per hour."

Your **Thermoid** Distributor can help you with your power belting problems — whether you need Multi-V, F. H. P. or flat transmission belts. For unusual belt problems, a **Thermoid** Field Representative is always available to give you the benefit of his experience.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packing • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company Offices & Factories: Trenton, N. J., Nephi, Utah

Equipment Shorts

QUIET DIESELS. Caterpillar Tractor Co., Peoria 8, Ill., recently offered a complete muffler group for the new diesel DW20 and DW21 tractors. The new attachment will reduce engine exhaust noise, thereby contributing to the comfort of operators and people who live near job sites. (31)

SILVER-ZINC STORAGE BATTERY. Yardney Electric Corp., New York 7, N.Y., announces a new line of miniature silver-zinc storage batteries called "Silvercel". These batteries are ideal for high discharge rates. They are about one-fifth the size of average storage batteries and one-sixth the weight. In one application, batteries consisted of 20 cells connected in series. The batteries weighed less than 15 lb., yet were able to provide power output of 4 kw. at 27 v. (32)

ELECTRIC DOORMAN. Electric Power Door Co. offers a line of automatic gate and door openers actuated by radio-frequency wave, pull-cord, ground-trip, electric-eye, or key-post switch. Surely one of these devices ought to prevent motormen from plowing through those closed mine ventilation doors. (33)

THAWING PITS. Hauck Manufacturing Co., Brooklyn 15, N.Y., makes complete equipment for radiant-type pits to thaw coal or bulk material in railroad cars. Oil or gas consumption of the units are low, averaging 9 to 12 gal. (or equivalent heat in gas) to thaw a car. (34)

HEAVY LIQUIDS. A new series of heavy liquids for determining specific gravity of minerals, gems and other substances by the sink-or-float method is offered by R. P. Cargille, New York 6, N.Y. Twenty-two standard heavy liquids are available, and liquids with any specific gravity up to 7.5 can be made to order. (35)

PLASTIC PIPE FOR BOREHOLE. Carlon Products Corp., Cleveland 5, Ohio, describes a unique use for plastic pipe—insertion of 180 ft. of 8-in. Carlon "T" rigid pipe in a borehole used to pump mine water. Water is pumped out of the mine at 800 gpm under an 80-psi static head. (36)

METALLIC RECTIFIER. General Electric Co., Schenectady 5, N.Y., announces a new line of metallic (selenium) rectifier power-conversion units designed for industrial applications such as excitation of synchronous motors, and other constant-voltage power supplies for dc motors. Simplicity of design and low maintenance costs are chief advantages. Ratings are listed for 230-v. and 460-v., of three-phase, 60-cycle, ac supply. Output ratings range up to 100 amp, 250-v. dc, and up to 200 amp for 125-v. dc. (37)

SPUR-GEAR CHAIN HOIST. Coffing Hoist Co., Danville, Ill., announces a new spur-gear hoist called the "Challenger" which offers unusual resistance to shock-loads. The entire unit including standard length of chain for an 8-ft. lift weighs only 39½ lb. A sealed construction allows the mechanical parts to run in lubrication thereby decreasing effort needed to operate the hoist. (38)

EYE SAVERS. Two-in-one, shatterproof glasses with interchangeable lenses for night driving and sun glare are introduced by Eye Savers, Inc., York, Pa. Lenses are curved to fit contour of face and designed to be optically correct. Retail price about $9.95 including plastic case. (39)

DRUM CRADLE. A handy cradle useful for moving, storing, or draining drums and barrels is made by General Scientific Co., Philadelphia 32, Pa. The all-steel unit contains an extensible handle which serves as a loading bar to permit safer loading of drums. (40)

FLUORESCENCE ANALYZER. North American Philips Co., Inc., New York, N.Y., announces a new Norelco fluorescence analysis unit for rapid qualitative and quantitative analysis of constituents in metals, alloys, minerals, ores, and chemical mixtures and compounds. Specimens are exposed to an X-ray beam which excites individual X-radiations in the elements under test. Combined radiations given off are then analyzed by the unit to yield quantitative and qualitative data on the composition of the sample. The unit is designed for research work and large-scale assay operations, not for prospectors. (41)

METAL FINISH. General Electric Co., Schenectady, N.Y., introduces a new Glyptal alkyd resin which dries dust free in 5 to 10 minutes, and tack free in 3 to 4 hours. The new resin, GE Glyptal 7422, is ideal for metal cabinets, automotive parts, and other metal surfaces. (42)

VACUUM CLEANERS FOR MILLS AND SMELTERS. Heavy-duty industrial vacuum cleaners suitable for removing hazardous dust or recovering valuable dust in mills, smelters and other plants are offered by United States Hoffman Machinery Corp., New York 3, N.Y. (43)

TUMBLING MACHINE. This is not for acrobats. It's a very useful unit made by Grav-i-Flo Corp., Sturgis, Mich., for de-burring and finishing of metal parts. Parts are dumped into an 18x40-in. rotating drum and tumbled about until clean. A unit similar to this was used by one Canadian mine operator to clean and reclaim old pipe couplings, nuts, bolts, and other steel and iron parts in the machine shop. The Grav-i-Flow unit is equipped to use water in the drum to aid the cleaning of parts and fittings. (44)

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after February 1, 1952, if mailed in U. S. or Canada.

NOT GOOD AFTER FEBRUARY 1, 1952—If mailed in U. S. or Canada November, 1951

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	31	38	45	71	78	85
2	9	16	32	39	46	72	79	86
3	10	17	33	40	47	73	80	87
4	11	18	34	41	48	74	81	88
5	12	19	35	42	49	75	82	89
6	13	20	36	43	50	76	83	90
7	14	21	37	44	51	77	84	91

My Name..... Position.....

Company .....

Address .....

For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

FILTERS AND PUMPS. Oliver United Filters, Inc., Oakland, Calif., has just released a bulletin describing 21 types of filters and the Olivite acid-handling pumps. ODS slurry and sludge pumps are included. (70)

HARD-FACING WITH METALLIZING. Conveyor-bucket lips, dipper parts, pump impellers, sizing screens, and blower parts can be built up and restored to usefulness by metallizing with Metco-Weld H described in a leaflet issued by Metallizing Engineering Co., Inc., Long Island City 1, N.Y. (71)

OIL SWITCHES. Load-break oil switches which provide safe sectionalization for underground cable systems are described and illustrated in new catalog of G&W Electric Specialty Co., Chicago 19, Ill. (72)

PAYLOADERS. The new 1¼ cu. yd. Hough Payloader tractor-shovel featuring full-reversing transmission, full-hydraulic bucket control, power-booster steering, and operator safety is illustrated in a new catalog by The Frank G. Hough Co., Libertyville, Ill. (73)

MORE DIESEL HORSEPOWER. Nordberg Manufacturing Co., Milwaukee, Wis., announces a new "Supairthermal" engine which produces one-third more horsepower than the conventional turbocharged engine of similar size. Read how this is accomplished in Nordberg's new Bulletin 191. The booklet also contains a useful nomograph enabling you to determine engine ratings and required cooling system for these engines. (74)

CHEMICAL PUMP. Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has published a bulletin which describes, illustrates, and gives specifications for new pedestal-mounted pump for handling chemicals, liquors, corrosive materials and solutions, hot liquids, and petroleum. Available in stainless steel, monel metal, nickel, or other special material. Sizes up to 1,200 gpm at heads 250 ft. and temperatures to 500 deg. F. For a copy circle No. (75)

WELDING ACCESSORIES. Tweco Products Co., Wichita 1, Kan., offers a catalog describing and illustrating their complete line of welding cable connections, electrode holders, carbon electrode holders, ground clamps, cable splicers, terminal connectors, solder and mechanical-type cable lugs. (76)

MOBILE BUCKET LOADERS. New 3-cu. yd. bucket loader, tractor or tire-mounted, suitable for loading sand, gravel, stockpile materials. Covered in Bulletin H75-77 by George Haiss Mfg. Co., Inc., New York 51, N.Y. (77)

HOW TO SERVICE BATTERIES. Gould National Batteries, Inc., Trenton 7, N.J., offers a two-page data sheet telling how to restore to full service motive power storage batteries which have lost capacity due to "sulphation." Sulphation is the formation of lead sulphate on the positive and negative plates due to continued undercharging while in use, or prolonged idleness without charge. (78)

TAMPING PLUG. Quick-Seal Products, Inc., Herndon, Pa., offers an instruction, leaflet explaining how to use their airtight tamping plug which seals explosive charges in blast holes, thereby yielding greater efficiency in blasting. The seal consists of a wooden wedge which is driven into an expanding plug. (79)

COMPLETE LINE OF MAGNETS. Dings Magnetic Separator Co., Milwaukee 46, Wis., offers a new bulletin describing their complete line of magnetic separators and lifting magnets. Magnetic units for concentration, purification, heavy-media recovery, and materials handling are included. (80)

NICKEL WELDING. International Nickel Co., New York, N.Y., has just released a new booklet containing 30 tables and 50 drawings covering fusion-welding of nickel and high-nickel products. Electric arc-welding and gas-welding methods are discussed. (81)

MINE HOISTS. Nordberg Manufacturing Co., Milwaukee, Wis., offers its new Bulletin 190 which describes and illustrates important modern hoist installations in U.S.A., Canada, Australia, and elsewhere. (83)

DIAMOND CORE DRILLS. E. J. Longyear Co., Foshay Tower, Minneapolis, Minn., offers a copy of revised Bulletin No. 71 on Wolverine Diamond Core Drills which includes specifications, and operating data on these powerful, lightweight drills designed primarily for underground drilling. The Wolverine has a capacity of 800 ft., drilling a hole 1⅛-in. in dia., and recovering EX size core ⅞-in. in dia. The drill is available with either electric or air-power units, and can be furnished with two types of swivel heads—a screw-feed type and a hydraulic type. For copies of this bulletin, circle (84)

FILTERS. Eimco Corp., Salt Lake City, Utah, describes their line of filters for chemical and metallurgical plants in a new bulletin, F2020-72. Units included are pan filters, drum-type continous vacuum filters, disc-type continuous vacuum filters, and continuous vacuum filters and dryers combined. (85)

FIRST CLASS
PERMIT NO. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in The United States

Postage Will Be Paid By—

McGRAW-HILL PUBLISHING CO., INC.
ENGINEERING & MINING JOURNAL
330 WEST 42nd STREET
NEW YORK 18, N. Y.

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

Memos from the Manufacturers

Independent Pneumatic Tool Co. announces that William V. Shakespeare has been appointed sales manager of Thor export sales division, with headquarters at 330 West 42d St., New York 18, N. Y.

Worthington Pump and Machinery Corp. has appointed H. V. Rasmussen executive engineer at the Wellsville, N. Y. plant.

The Hyster Co., Portland, Ore., has promoted Allen G. Owen to Western Division sales manager with territory including Alaska, western Canada, and all of U.S.A. James Leep has been advanced to manager of the parts order department.

Norton Co., Worcester, Mass., and **Behr-Manning Corp.**, Troy, N.Y., have formed a new company, Norton Behr-Manning Overseas, Inc. which will handle the exports of these two companies and direct operations of subsidiary manufacturing plants in Australia, Canada, England, South Africa, and elsewhere. The Norton Co. makes abrasives and grinding wheels, and the Behr-Manning company manufactures coated abrasives.

John P. Roberts, aged 43, assistant general manager of the Timken Roller Bearing Co., service sales division, was killed in an auto accident near Spruce Pine, N.C., Sept. 19.

National Mine Service Co. has appointed J. B. Templeton as sales representative covering the Illinois and Indiana fields. His headquarters will be in Herrin, Ill.

Woven Wire Fabrics Division of John A. Roebling's Sons Co. has named J. Peter Brehm as San Francisco district sales representative.

Cate Equipment Co. has been designated as the new district sales office of Chain Belt Co. in the Salt Lake City area.

A huge **Plant Maintenance Conference** is scheduled for Jan. 14-17 at Convention Hall, Philadelphia, Pa. A maintenance show will be held concurrently. Topics covered at the sessions will include maintenance costs, inspection methods for preventive maintenance, planning and scheduling maintenance work, and lubrication. Write to Banner & Grief, 250 West 57th St., New York 19, N.Y., for full details.

Southwestern Engineering Co. has appointed H. V. Hughes as manager of the industrial division, which handles construction, metallurgical and chemical plants, heavy-media separation plants and the SWECO metallurgical laboratory.

United Engineers, 252 West First St., Reno, Nev., is offering engineering services for mine operators in the Nevada-California area including mine surveying, assaying, geologic mapping, and drafting. The firm expects to serve small mine operators who cannot afford their own engineering staffs.

Nordberg Manufacturing Co., Milwaukee, Wis., announces the appointment of Bruno V. Nordberg as sales engineer of the four-cycle engine department.

R. G. LeTourneau, Inc. Roy E. McCluskey, vice president and general sales manager of the LeTourneau Co., has been elected to the board of directors of the International Road Federation. The Federation has been designated by the ECA as spokesman for the U. S. highway industry.

C. H. Wheeler Mfg. Co. Wheeler fine-particle reduction mills, also called Fluid Energy mills, are now available for outright purchase, the company announces. Formerly these mills were available only on a lease and rental basis, which often entailed the user's revealing confidential production figures. The new policy should widen the usefulness of the mill, the company believes. The mill itself uses pressurized air or other vapor medium to drive particles to be ground about a closed ring-like chamber. Grinding is done by attrition, and output is of sub-micron size, if desired. The company is located in Philadelphia, Pa.

Manhattan Rubber Co. Austin L. Hawk has been appointed assistant sales manager of the western sales district of Manhattan Rubber Division of Raybestos-Manhattan, Inc. He will be located at 445 Lake Shore Drive, Chicago, Ill. S. V. V. Hoffman has been appointed regional manager for Raybestos-Manhattan's west coast sales district, with headquarters at 4651 Pacific Boulevard, Los Angeles, Calif.

Allis-Chalmers Mfg. Co. Richard E. McElvain has been named a member of Allis-Chalmers' Duluth, Minn., office. He is a specialist in crushing equipment and mining machinery.

RUBBER CONVEYOR BELTING

TOUGH COVERS Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength (2500-3000 lbs.). Thoroughly capable of withstanding the abrasive action of bulk materials.

STRONG CARCASS Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply has a 16-19 lb. average friction pull.

FLEXIBILITY Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following features: troughs easily, runs true on idlers, gouge resistant.

WHY WAIT?
WE HAVE 8" TO 48"

IMMEDIATE SHIPMENT FROM STOCK

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

SEND US YOUR INQUIRIES FOR OTHER INDUSTRIAL RUBBER PRODUCTS.

INQUIRE FOR SIZES NOT LISTED
ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK.

Write for Free Booklet on Installation, Care & Maintenance of Conveyor Belting.

CARLYLE RUBBER CO., Inc.
64 Park Place, New York 7, N. Y.
Phone Digby 9-3810

THOMAS
Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

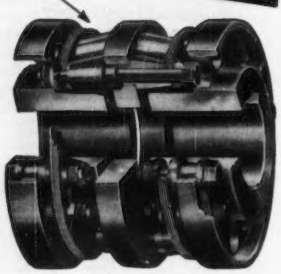
Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years

BACKLASH
FRICTION
WEAR and
CROSS-PULL
are eliminated
Lubrication is not required!

PATENTED FLEXIBLE DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

NEW BOOKS

CORNISH ENGINEERS. By Bernard Hollowood. Illustrated by Terence Cuneo. Designed and produced by Samson Clark & Co. for Holman Bros., Ltd., Camborne, England, Pp. 96, with five additional color plates.

In celebration of its 150th anniversary this year, the widely known Cornish firm of Holman Bros. commissioned its agents to produce this beautiful book as a record of the first century and a half of its activities. The collaborators have made the most of their unique opportunity. In most interesting fashion, they have sketched the development of this typically British enterprise against the picturesque and ancient background of Cornish mining.

The foundations of the firm were laid when Nicholas Holman, described as a "blacksmith and whitesmith," opened a boiler works in 1801 at Pool, near Camborne, to serve the local mining industry. He is said to have worked with and for many of the famous Cornish engineers, including Richard Trevithick, to whose steam road carriage he made contributions.

In 1839, Nicholas' youngest son John established a boiler works and foundry at Camborne. Here for more than 40 years he conducted a business as "brass and iron founder and general engineer." Almost every type of mining equipment was produced. In 1880 two sons of John began a partnership under the name of Holman Bros.

Lean years had already come upon Cornish mining, owing to rich finds of tin and copper overseas. Metal prices fell, mines shut down, and great numbers of miners went abroad to the new mineral areas of the Western Hemisphere, Africa, Australia and Malaya. Here the Cousin Jack played an important part in the development of a myriad mining ventures.

Holman Bros. survived the slump at home. Improved equipment from their shops helped arrest the general decline. The rock drill made cheaper mining possible. Camborne survived, its population actually increasing, while that of Cornwall decreased.

Expansion of the business ensued after James died in 1892. Mining machinery of every kind was made in the 20 years leading up to the first World War. During that struggle, Camborne, with the Holman plants, became an arsenal, its production resources being changed over almost wholly to munitions, including the Holman-Farrar tunneling air pump, a wartime invention. During World War II, the firm's activities, and those of its plants abroad, were governed almost wholly by war contracts from government agencies.

In the decades since the first war, after which Holman's program for pneumatic tools was launched, this line of activity has come to occupy one of the firm's three most important departments.

In this period, mining in Cornwall finally faded away. The firm ceased to make heavy mining equipment. Today their output is confined largely to compressors, winches, hoists, sharpeners, rock drills, carbide bits, and pneumatic tools. The business is world-wide.

Through four generations, the growth of the company's business has been guided by the founder's direct descendants. The present board of directors consists of seven Holmans, four of whom represent the fifth generation. The tenacity of purpose exhibited has made the firm what it is today.

Minerals Yearbook, 1949. U. S. Bureau of Mines has just published the 1949 volume of the well-known Minerals Yearbook. The new edition is much improved over previous editions, particularly in the manner in which statistical tables are compiled. Commodity discussions conclude with a World Review chapter giving production by countries and other important data. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Pp. 1662, Price $4.50.

Canadian Mines Handbook. Lists 9,081 companies, of which 865 are carried on the active list. Published by Northern Miner Press, Toronto, Ontario. Pp. 352, Price $2.

High Calcium Limestones in the Area Served by the Baltimore and Ohio Railroad. An excellent commodity study covering the states of Illinois, Indiana, Maryland, New York, Ohio, Pennsylvania, Virginia, West Virginia. Topics discussed include geology of limestone, production, high-calcium limestone uses, and a summary of stratigraphy. Pp. 105 including numerous maps, charts and tables. Address inquiries to Manager, Industrial Development, The Baltimore and Ohio Railroad Co., Baltimore 1, Md.

Optima—a new quarterly South African journal inaugurated by Anglo American Corporation of S.A., Ltd., and certain associated companies including De Beers Consolidated Mines, Ltd. The magazine is intended primarily to keep some 120,000 shareholders of the above companies informed on activities and economic developments affecting the enterprises. In the first issue articles such as these appeared: "The Dollar, the Pound, and the Price of Gold;" "The Diamond Research Laboratory;" "Devaluation and Its Effect on the Gold

Mining Industry;" "Daggafontein Mines;" "The Group System of Administration in the Gold Mining Industry;" "The Importance of Borehole Results in Prospecting and Developing a New Goldfield;" and others. Published by Anglo American Corporation of South Africa, Ltd., Johannesburg, S.A.

Conference on Silicosis and Aluminum Therapy, January 1951. Published by McIntyre Research Foundation, Suite 1500, 25 King St. West, Toronto, Ontario, Canada. Silicosis and related topics are discussed in this informative booklet which includes papers on prevention of silicosis in Ontario mines, tuberculosis prevention program in Ontario, recent advances in the treatment of silicosis, pneumoconiosis research in Great Britain, a progress report on aluminum prophylaxis, and ventilation and dust control. Under recent advances in the treatment of silicosis, Dr. Gordon of Philadelphia, Pa., describes a method of administering positive pressure breathing treatment accompanied by drugs in vapor form to silicosis patients. Relief experienced by the patients was described as "remarkable in the majority of cases" although evidence was lacking that silicosis *per se* was being retarded. Dr. Hannon of McIntyre Research Foundation describes a 9-year experiment involving workers in a refractory plant in which 14 were treated with aluminum therapy and 12 were not. At the end of 9 years all of the 14 who were protected had normal chest conditions, whereas 11 out of the 12 who were not treated with aluminum therapy had "developed changes in their lungs which are characteristic of silicosis."

The following reports may be obtained from the Publications Distribution Section, Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.:

R.I. 4800. Diamond Orientation in Diamond Bits, Procedures and Preliminary Results.

R.I. 4784. Investigation of the Norwich Manganese Deposit, Silver Bow County, Mont.

R.I. 4780. Concentration of Oxide Manganese Ores from Lander County, Nev.

R.I. 4787. Study of Pre-Heating Colorado Oil Shale.

R.I. 4774. Investigation of Copper Canyon Lead-Zinc Deposit, Lander County, Nev.

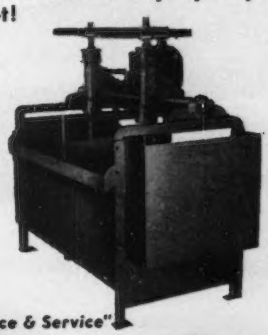
R.I. 4786. Selective Flotation Concentration of Lead-Zinc Ores from the Musick and Helena Mines, Bohemia District, Oregon.

R.I. 4791. Investigation of the Torpedo Copper Deposit, Organ Mining District, Dona Ana County, N. Mex.

I.C. 7600. Bureau of Mines Approval System for Respiratory Protective Devices.

FLEXIBILITY of AGITAIR is mill man's dream come true . . . . .

High recovery at minimum cost of operation is the goal of millmen and field engineers in every industry faced with a problem of concentrating values. That's why—in every part of the industrial world—the most exacting of them are using AGITAIR—the machine famed for simple and easy adaptability to varying flotation demands. For example, simple changes in impeller characteristics readily adapt AGITAIR Flotation to rougher, cleaner or scavenger circuits. Variable impeller speeds and manipulation of the air volume to individual cells provide the flexibility that streamlines and stabilizes day by day production. That spells p-r-o-f-i-t!



Fully illustrated literature will be mailed on your request.

•

Your correspondence on special problems will be promptly answered.

"Leaders in Experience & Service"

THE GALIGHER CO.

METALLURGICAL DIVISION — ENGINEERING SERVICE

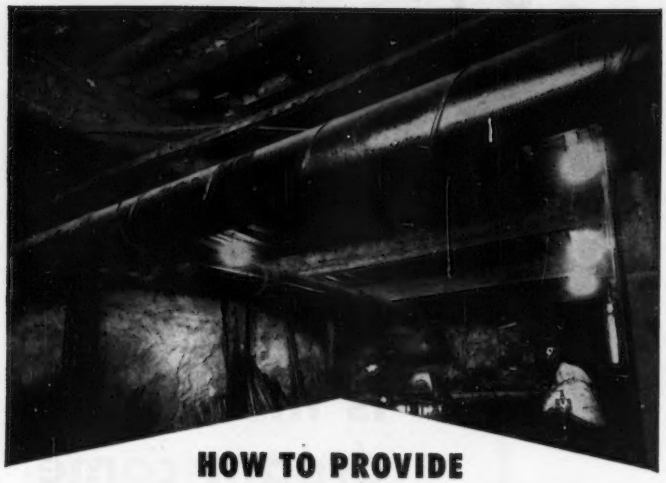
CONSULTATION • ORE TESTING
PLANT DESIGN • CONSTRUCTION

HOME OFFICE
545 West 8th South
Salt Lake City, Utah
P. O. Box 209

EASTERN OFFICE
921 Bergen Avenue
Jersey City
New Jersey

Agents in All Principal Foreign Mining Districts

Representing, GENERAL ENGINEERING CO. of CANADA, Ltd., U. S. A., MEXICO, SOUTH AMERICA

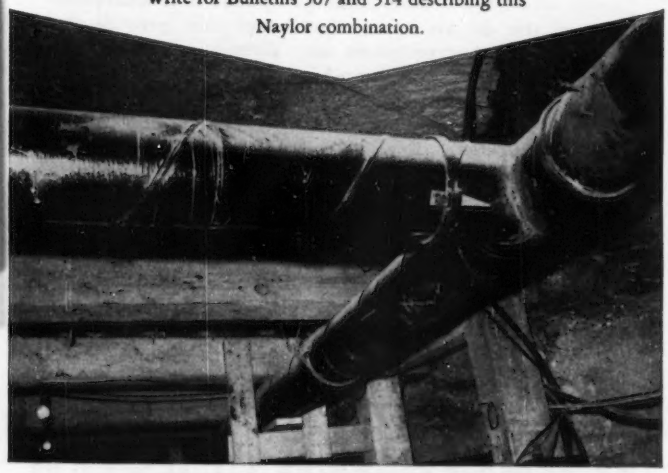


HOW TO PROVIDE
FRESH AIR For Underground Operations

Mining engineers have found the practical answer in the combination of Naylor Pipe and Naylor Wedge-Lock Couplings.

Air lines can be installed quickly with this dependable lightweight pipe and these one-piece, positive-type couplings that provide the fastest possible connections, even in limited space. Though light in weight, Naylor Pipe has the extra collapse strength, due to its exclusive Lockseam-Spiralweld structure, to do double duty in push-pull ventilating service. Thus Naylor lines supply fresh air as well as exhaust dangerous fumes.

Write for Bulletins 507 and 514 describing this Naylor combination.



NAYLOR PIPE

Naylor Pipe Company, 1243 E. 92nd St., Chicago 19, Ill.
New York Office, 350 Madison Avenue, New York 17, N.Y.

Arizona *(Continued from 106)*

Marysvale, Utah, nearest government purchasing depot, took most of the profit out of the venture.

CALIFORNIA

Central Eureka Finds New Ore

★**Central Eureka Gold Mines** reported a new strike at its property in the Mother Lode country in October. Company President J. D. Swift said the new ore drift was contacted in greenstone and slate at the 3,800-ft. level and seems to extend southward toward the old Eureka shaft at least 150 to 200 ft. and may measure 650 ft. across at the 4,150-ft. level.

★**Black Rock Mining Corp.**, Bishop, has received DMA approval of a contract for tungsten exploration. The government will contribute $46,218 of the $61,624 project. Black Rock's Lincoln mines division plans to build a $600,000 250-ton tungsten concentration mill near Hiko, Nev. Ore is presently being shipped from the Nevada property to Bishop.

★**Tungstar-Hanging Valley Mining Co.** has leased its Bishop tungsten mill to Wright H. Huntley, president of **Huntley Industrial Minerals, Inc.** The mill, built at the start of World War II, is in Pine Creek Canyon near the U. S. Vanadium Corp. mill. After reconditioning the mill for straight gravity operation, Huntley plans to run 200 tons a day of old tailings and about 100 tons of ore from his Tungsten City mines.

★**Norman C. Johnson, Corvallis, Ore.**, has purchased the **Tyson chrome mine** near Crescent City, Calif. An important chrome producer during World Wars I and II, the mine was first worked in the 1880's by the Tyson Mining Co. of Baltimore, Md.

★The Joubert mine, near Nevada City, has been sold to Joseph G. Brown of Cathedral City at a reported price of $30,000. The property includes 160 acres of patented land and seven claims of 20 acres each in Yuba and Sierra Counties. Opened in 1855, it is believed to be the oldest hydraulic mine in the West.

COLORADO

★Gold bricks Nos. 11 and 12 have been shipped from the **Golden Cycle's new Carlton mill** to the United States mint in Denver. The gross value of the two bricks was $52,600. Buck Keil, superintendent of the plant at **Cripple Creek**, stated that they are now cyaniding in the raw concentrates which previously were roasted and re-cyanided. There is now higher efficiency

in the dust collectors within the mill—"Just one of those changes we are continually making in the milling process to improve our recovery," he said.

★**Isabella Mines, Inc.** has opened the Lee shaft of the Isabella Mine at Cripple Creek under lease from the Empire Lee Mining Company, according to Bill Kyner, president of Isabella's board.

★AEC reports that diamond drilling has uncovered excellent orebodies on the Colorado Plateau. At one place the rimrock of a mesa had produced a few hundred tons of vanadium ore from a series of small deposits over 30 years. The deposits did not appear sufficiently attractive for private industry to prospect the mesa. As a part of the AEC drilling program, after test drilling, 1,000 holes sunk in the area averaged less than 200 ft. deep, and revealed a considerable body of uranium ore.

★**A. A. Smith,** general manager of the **Silver Bell Mines Co.** at Ophir, said here that gallium has been found in the Silver Bell Mine. Smith stated that a diamond drill hole driven ahead from the mill level tunnel passed through a much altered zone, and spectroscopic determination showed the presence of gallium in this zone. Chemical analysis gave a 0.015% gallium ($390 per ton in metal content) at a depth of 2,000 ft. below surface.

★**General Manager Marvin Kay** announced that the **American Zinc, Lead and Smelting Co.** took a lease on the Caledonian mine at Silverton, and has started to develop it.

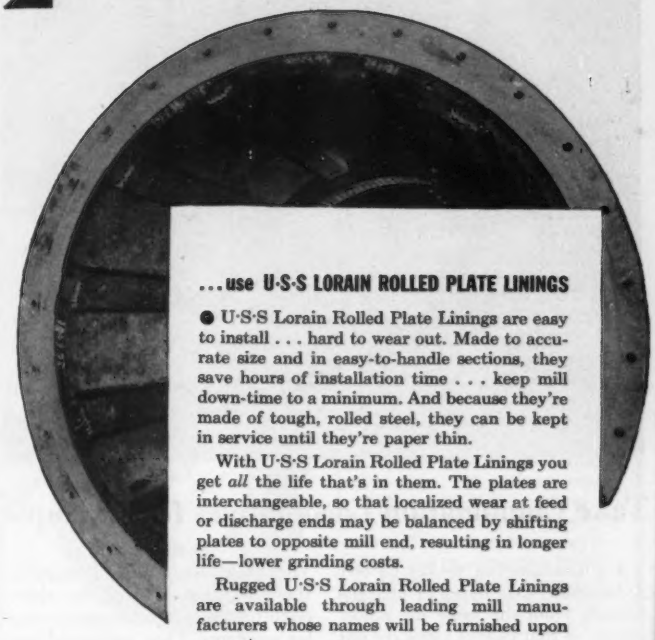
★**Silver Bay Mines, Inc.** has received a DMA exploration loan for $40,000 for its Black Hawk and Occidental mines in San Juan County. Ernest S. Hoffman, general manager, announced that work will start immediately at the mines, above the old mining camp of Gladstone. Initial work will consist of driving the Hurley crosscut-adit about 500 ft. to cut the downward projection of the Occidental zinc-lead-silver-gold vein which the company has developed by three adit levels above.

★**Acme Mining Co.** has obtained a five-year lease on the Carbonate Queen gold mine in Cripple Creek, Colo., William A. Hayes of San Francisco has announced. Operations have already started. The property is ¼ mi. from the Carlton mill, and workings are drained by the Roosevelt and Carlton tunnels.

★**Colorado Western Land Co.,** Glenwood Springs, started operations in August on a group of claims in the Turret district. Principal ores in the area are beryl, feldspar, mica and samarskite.

★**Five uranium mines** in the Colorado Plateau area—two in Grand County, Colo., and one in San Juan County, Utah, have been certified as eligible for bonus payments for ore shipped to AEC.

2 ways to make sure of BETTER, CHEAPER GRINDING



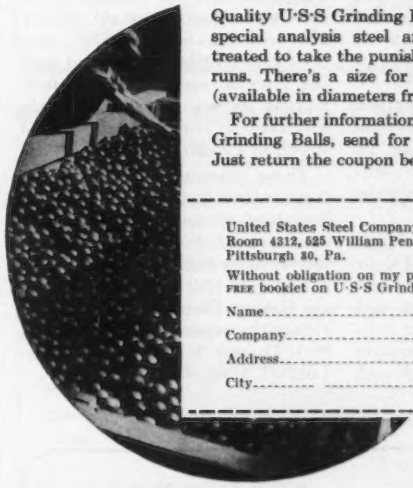
...use U·S·S LORAIN ROLLED PLATE LININGS

● U·S·S Lorain Rolled Plate Linings are easy to install . . . hard to wear out. Made to accurate size and in easy-to-handle sections, they save hours of installation time . . . keep mill down-time to a minimum. And because they're made of tough, rolled steel, they can be kept in service until they're paper thin.

With U·S·S Lorain Rolled Plate Linings you get *all* the life that's in them. The plates are interchangeable, so that localized wear at feed or discharge ends may be balanced by shifting plates to opposite mill end, resulting in longer life—lower grinding costs.

Rugged U·S·S Lorain Rolled Plate Linings are available through leading mill manufacturers whose names will be furnished upon request.

...use U·S·S GRINDING BALLS



Quality U·S·S Grinding Balls are forged from special analysis steel and accurately heat-treated to take the punishment of long, heavy runs. There's a size for every grinding need (available in diameters from ¾″ to 5″).

For further information about durable U·S·S Grinding Balls, send for our FREE booklet. Just return the coupon below.

United States Steel Company
Room 4312, 525 William Penn Place
Pittsburgh 30, Pa.

Without obligation on my part, please send me your FREE booklet on U·S·S Grinding Balls.

Name.....

Company.....

Address.....

City..... State.....

UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S LORAIN ROLLED PLATE LININGS AND U·S·S GRINDING BALLS

1-1318

USS

UNITED STATES STEEL

Take Combination Locomotives for Example

In a combination trolley-battery locomotive, the battery is charged directly from the mine d-c power supply so that charge rates are not critically controlled. Edison Nickel-Iron-Alkaline Storage Batteries meet this condition consistently. In fact, they can safely be charged at full normal rate at any state of charge and, for short periods of time, at even higher rates. Nor do they require equalizing charges. When used in straight battery locomotives, they usually can be charged in six to seven hours; this helps get the charging done during off-peak hours.

However, their non-critical charge characteristics are only one of their advantages. They are *durable mechanically:* grids, containers and other structural parts of the cells are of steel. The alkaline electrolyte is a recognized preservative of steel. They are *foolproof electrically:* they are not injured by short-circuiting, reverse-charging or similar accidents. They *withstand temperature extremes:* they are not injured by freezing at any state of charge because the density of the electrolyte does not vary appreciably with the state of charge; they are easily ventilated for rapid cooling. They can *stand idle indefinitely* without injury: they are merely discharged, short-circuited, and stored in a clean, dry place.

These characteristics add up to trouble-free operation, unequaled long life and economy per year of operation. The combination of these factors helps explain the preference of cost-conscious users. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

YOU CAN ALWAYS RELY ON

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

Colorado *(Continued)*

★**The Bachelor Development Co.** of Ouray is again operating the old Bachelor mine with Julius R. Sonza of that city as manager. The company is working six men, and new machinery and equipment is arriving.

★**The new 250-ton Silver Shield mill,** about a mile north of Ouray, recently began operation. Silver Shield Mining & Milling Co. reports that it has 12,000 tons of ore that is now going to the new mill. The Silver Shield is reportedly planning to install a 25-ton electric concentrate smelter.

★**Modern Gold Dredging Co.** of Spokane is planning to construct a washing and jigging plant near Craig, Colorado, to handle 2,500 cu. yd. of gold-bearing sand daily from placer ground, according to John Sims, manager and treasurer. The firm, incorporated last fall, has sunk 900 test pits on 1,600 acres of Colorado's Four Mile mining district. Company officials estimate mining costs can be held to about 6¢ a cubic yard by using a LeTourneau scraper.

★An exploration project is under way at the Akron lead-zinc mine of the **Callahan Zinc-Lead Co.** at White Pine. Half the projects cost, $200,000, is being underwritten by the DMA. Under the direction of James E. Dunn, superintendent, mine crews have started driving a drift from Akron mine workings northwesterly to explore in depth for the continuation of orebodies mined near the surface. About 2,000 feet of drifting will be necessary to reach the area which is in ground owned by the Hayden Mining Company and said recently to have been taken under lease-option agreement by Callahan.

★Samples of ore taken from the Copper King mine, 45 mi. northwest of Fort Collins, Colo., have been examined by the AEC and found to contain pitchblende. It is too early to tell whether or not this find will be of importance as a uranium source, but AEC is following with interest the development of the mine by its owners.

★**Oscar Schaaf** of Tacoma, Colo., **reports finding scheelite** in his Bitterroot mine in an outcrop that assayed 0.87%. Driving a tunnel 100 ft. lower, he cut scheelite again at 160 ft., and is now planning to resume work when he completes a pumping system to supply water from the Animas River to his mill and compressor.

IDAHO

★The **Spokane-Idaho Mining Co.** is reopening the old Paymaster mine in Blaine County.

★Stock books and records of the **Lucky Friday Extension Mining Co.** have been turned over to a new board of directors composed of C. W. Bentley, Chris Peterson and John Kennedy,

all of Mullan, after an extended lawsuit over stock control. However, the Extension vein system is to be prospected by crosscutting north on Lucky Friday's 2,000-ft. level.

★One of the latest developments in the Mullan area of the Coeur D'Alene district is the formation of the Silver Valley Lead Mining Co. (a subsidiary of the Sullivan Mining Co.), to take over mining property east of Mullan. The company is incorporated for 5-million shares of stock and has already contracted to acquire the Idaho Silver Co. group of 11 patented and 8 unpatented mining claims; the O'Brian Gulch Silver-Lead Co., 26 unpatented claims; The Lucky Boy Co., recently purchased by Bunker Hill, 36 unpatented claims; Snowstorm-Coughlin group, 29 patented and unpatented claims; Hibernia Silver-Lead Co., 25 unpatented claims; the Worthington Ranch Homestead, recently purchased by Hecla; the Lindroos Ranch Homestead and the Hale Fish Hatchery. On these last named ranch properties, only the mineral rights are bargained for; surface rights are not included.

South of the Silver Valley Co.'s holdings, the Cortez Mining Co., reportedly a Coronado Copper Co. subsidiary, is acquiring other mining property.

The Silver Banner Mining Co., said to be another Coronado Copper Co. subsidiary, which recently purchased the Moe group west of Mullan, has now purchased the Gem State mining property, adjoining the Moe on the north and west, and consisting of 8 patented and 14 unpatented claims. Silver Banner proposes to develop both groups with a deep shaft, the location of which has not yet been determined.

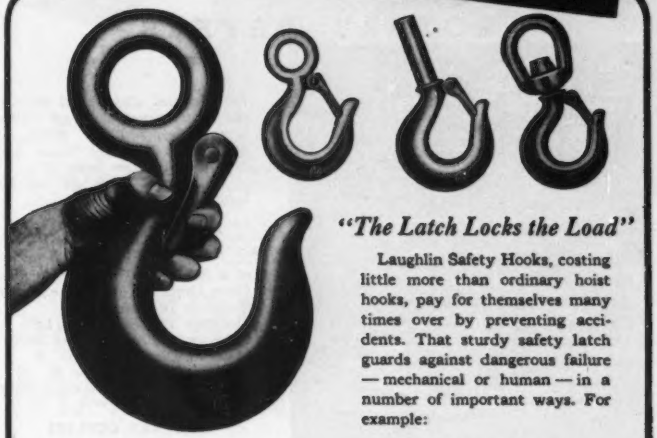
★**The Calera Mining Co.** made the initial shipment of copper concentrates from its recently completed milling plant in Lemhi County, near Salmon. The mill is primarily a cobalt concentrating plant, but the cobalt concentrate is being stockpiled pending the completion of the Garfield, Utah, refinery. The company's 600-ton mill started operations in June this year.

★**Polaris and Silver Summit** are starting to drift on the Silver Summit east oreshoot 200 ft. above the 3,000-ft. level. The company had originally raised on ore to a point 70 ft. above the level, where the mineral changed from tetrahedrite to lean chalcopyrite —no longer ore. Recently the company drove a raise above the 2,800-ft. level to provide more sheave-wheel room for the current shaft operation, encountered good milling ore, and decided to prospect the 3,800-ft. level. The company is also preparing the recently encountered west orebody for production and is producing 200 tons daily from the east orebody below the 3,000-ft. level.

★**Lucky Friday Silver-Lead Mining Co.** just shipped 7,000 tons of mine-run ore to the Golconda custom mill,

SAFETY THAT'S BEYOND PRICE!

Yours for little extra cost with LAUGHLIN Safety Hooks



"The Latch Locks the Load"

Laughlin Safety Hooks, costing little more than ordinary hoist hooks, pay for themselves many times over by preventing accidents. That sturdy safety latch guards against dangerous failure — mechanical or human — in a number of important ways. For example:

1. It prevents load from slipping or jarring loose in mid-air.
2. It eliminates the hazard of carelessness — the load that was *supposed* to be lashed but *wasn't*.
3. It prevents overcrowding the hook.
4. It warns of hook failure, because latch will open if hook starts to spread.

Rig Safety into YOUR Hoists

by changing over to Laughlin Safety Hooks. Made of drop-forged, heat-treated steel, they have pressed steel latches in the smaller sizes, cast bronze latches in the larger sizes, all with stainless steel springs. Available in various types for 750 lb to 15 ton safe working loads at your mine, mill or oil field supply house.

Free! Catalog-Data Book tells you how to select the *right* wire rope and chain *fitting* for every job. Complete specifications — helpful tables. Use the coupon below.

SEND IN TODAY ... no cost or obligation

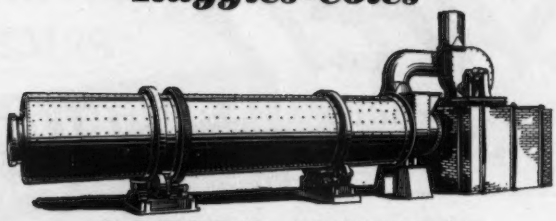
THE THOMAS LAUGHLIN COMPANY
611 Fore Street, Portland 6, Maine
Please send Catalog-Data Book #150 to:

Name ..... *Position* .....
Company .....
Street .....
City ..... *Zone* ..... *State* .....

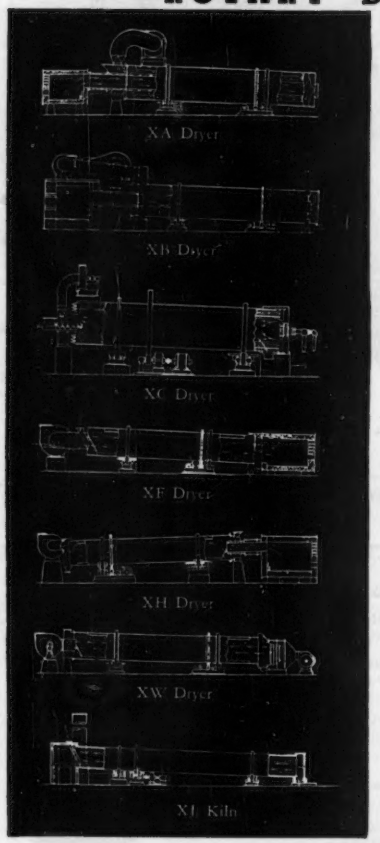
LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

Ruggles-Coles



ROTARY DRYERS



Double and single-shell continuous rotary dryers in seven distinct types — designed for direct, indirect, hot air and steam heat. Available in sizes from 3′ to 10′ in diameter — from 10′ to 100′ long.

TYPICAL PERFORMANCE DATA . . .

of a XA-12 (80″ x 45′) Ruggles-Coles Dryer on –⅜″ Coke Breeze:
Moisture in Feed: 20%
Moisture in Discharge: 1.5%
Capacity: 13000 lbs. per hour
Material Discharge: 220° F.
Drive: 40 H.P. motor
(Dryer in operation since 1938)

ROTARY COOLERS

For cooling hot materials after high temperature drying or calcination. Available in three types: air cooled, water spray cooled, and semi-submerged. From 3′ to 10′ in diameter, shell lengths to suit.

ROTARY KILNS

For continuous calcining, roasting or oxidizing. Retractable firing head. Fired by oil, gas or pulverized coal. Available in sizes from 3′ to 9′ diameter—30′ to 90′ long.

Write Hardinge for Bulletin 16-D-1 which describes the entire line of Ruggles-Coles Rotary Dryers, Kilns and Coolers.

HARDINGE
COMPANY, INCORPORATED
YORK, PENNSYLVANIA—240 Arch St. Main Office and Works
NEW YORK 17 • SAN FRANCISCO 11 • CHICAGO 6 • HIBBING, MINN. • TORONTO 1
122 E. 42nd St. 24 California St. 205 W. Wacker Dr. 2016 First Ave. 200 Bay St.

Idaho *(Continued)*

which recovered eight carloads of lead concentrate and one of zinc. Judging from previous similar shipments, it will net the company $125,000.

★**Compton I. White,** former Idaho congressman, owner of the Whitedelf silver-lead mine at Clarks Fork, Idaho, was awarded a DMA loan of $28,655 for prospecting the Clarinda copper property near the Whitedelf.

★**The Apache Mining Co.,** which recently constructed a milling plant near Hailey, Idaho, is now milling 80 tons of ore per day, part of which is taken from the mine and part from the old mine dump. Frank Humphreys is in charge of operations.

★**The University of Idaho** engineering department is trying to determine the most economical method of processing Idaho's heavy metals, especially columbium and tantalum. Both are found in the monazite sands being processed by the Rare Minerals Company at McCall and from pegmatite dikes in the Garden Valley district of Boise County.

★**Idaho Goldfields Mining Co.** is driving a tunnel on a silver-lead vein in the Fourth of July Canyon, following an ore streak 20 in. wide which assays $100 per ton, according to W. M. Fredericks, of Spokane, president. The company plans to follow the vein 200 ft. to a point where it apparently merges with another mineralized structure, and to sink at that point.

MICHIGAN

★Modernization of railroad equipment of the **Calumet & Hecla Consolidated Copper Co.** was completed for the present when a new 120 ton, 1,200-hp. diesel engine was received from the Baldwin-Lima-Hamilton Corp.

★The Lake Superior & Ishpeming R.R., serving the Michigan ranges, handled a new high total of 800,000 tons of iron ore this August. The tonnage required 75 boats, an average of 10,667 tons per boat.

★With the completion of the new headframe and hoisting house at its **Tracy mine,** Jones & Laughlin Ore Co. has resumed sinking from the 100-ft. depth where it had stopped in ledge. For the present, the shaft will be bottomed at about 1,350 ft., where the second level will be developed. This will require about a year.

★After three months of work in rehabilitating the old Carpenter shaft at Crystal Falls, **Pickands Mather & Co.** has decided that the shaft will be able to serve the adjoining Monongehala mine if it is decided to start mining there.

★**M. A. Hanna Co.** has let a contract to the Foundation Co. of New York to sink the new Cannon shaft for the Bengal-Tully-Baker property through

130 ft. of overburden to ledge. The shaft will be of concrete and 15½ x 21 ft. in cross section and will go eventually to 1,000 ft. It will be ¼ mi. east of the present Bengal mine shaft. The Foundation Co. has just completed a shaft for the Puritan Mining Co. at Bessemer, Mich., and has moved its men and equipment to the Cannon job. Six months will be required to reach the ledge and two years to complete the shaft. Another two years of development is planned to bring the production of the Bengal-Tully-Baker mine to the scheduled 1-million tons per year.

★Construction by Western-Knapp Engineering Co., San Francisco, on **M. A. Hanna's new pilot plant** for treating low-grade ores at the old Groveland mine near Randville, Mich., is nearing completion. According to S. E. Quayle, manager for Hanna in northern Michigan, if there are no delays, the plant may be able to start Nov. 1. He emphasized again that this project is purely experimental. The Bacco Construction Co., of Iron Mountain, has a contract to mine 25,000 tons of low-grade ore at the mine to furnish the crude for the experiment. They expect to do this before Nov. 1. The Hanna Co. has obtained options for leases on approximately 2,560 acres in this area of Sagola and Felch townships. If the test work is successful, the company will make an intensive study of shipping, marketing, and other factors before building a commercial plant.

MINNESOTA

★Pickands Mather & Co. is building an ore-loading pocket for its new Rabbit Lake mine on the Cuyuna Range. The ore will be crushed before delivery to the pocket.

★The U. S. Bureau of Mines dedicated its new $750,000 Lignite Research Laboratory, at Grand Forks, N. D., Sept. 29. North Dakota lignite deposits are estimated at 300-billion tons.

★Oliver Iron Mining Co.'s Fayal underground mine at Eveleth ceased active operations Sept. 1. Originally opened in 1897 by Fayal Iron Co. and taken over by Oliver in 1902, it has shipped from pit and underground more than 33½-million tons. Employees affected have been transferred to Oliver's Spruce mine nearby.

★With the discovery of new and large additions to Alberta's natural gas supply, the possibility of using gas in taconite beneficiation plants on the Mesabi is being discussed. The 1,100-mi. oil pipe line from Edmonton, Alta., to Superior, Wis., has carried as much as 78,000 bbl. in one day.

★**Pickands Mather's Embarrass mine** has received the "Sentinels of Safety" award for the second consecutive year. The presentation was made Sept. 19.

★**Escanaba docks** are expected to handle 7-million tons of ore before

on difficult work
YARDAGE GOES UP...
costs go down
when you use
SAUERMAN MACHINES

Picture shows a Sauerman Scraper digging into a hill of volcanic ash 250 ft. high and loading the material into cars. Work was started by power shovels but scraper was installed because its long reach insures complete safety and ultimately larger capacity. Scraper also has proved more economical.

Many material handling jobs can be accomplished safely and economically only by using a long range machine which permits the operator to remain outside the actual working area. Such machines are the drag scrapers and cableways which have been Sauerman specialties for almost half-a-century. Four major types of these machines are described below.

Drag Scraper Excavator—For speedy pit and hill excavation, rehandling industrial wastes, cleaning out ponds and general earthmoving. Combines long reach with large handling capacity to give low cost per cubic yard of materials handled.

Drag Scraper Stockpiler—Storing and reclaiming is an easy, one-man job with a Sauerman Drag Scraper—indoors or in the open. Handles all kinds of bulk materials. In stockpiling coal, the scraper builds a compact pile safe from spontaneous combustion.

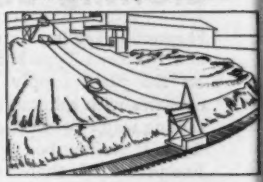
Slackline Cableway Excavator—Reaches far across pit, water or sludge; quickly digs deep, conveys and elevates to high dumping point. Bucket returns by gravity to digging point.

Tower Excavator—This is a self-propelled drag scraper machine with a high tower at the head end carrying the scraper hoist and a low tower at the tail end. Towers are mounted either on crawlers or on swivel trucks and move along in unison under control of the scraper operator. A popular machine for strip mining.

Other Sauerman Machines—Sauerman also builds Scraper-Loaders, Power Rakes, Tautline Cableways, Durolite Wire Rope Blocks.

Write today for illustrated catalogs. Specify the types of equipment in which you are most interested.

Sauerman Scraper Excavator



Sauerman Scraper Stockpiler

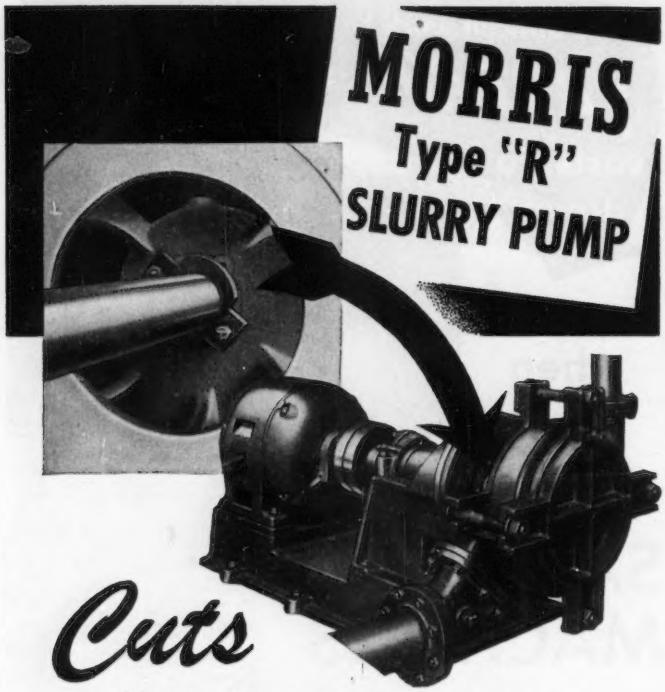
Sauerman Slackline Excavator

Sauerman Tower Excavator

Rope Haulage Equipment Specialists Since 1909

SAUERMAN BROS., Inc.

584 S. CLINTON ST. CHICAGO 7, ILLINOIS



Cuts

Stuffing Box Maintenance...

Fluctuating Sealing Water Pressure Is No Problem when you install a Morris Type R Slurry Pump. Even when peak demand on the plant supply line lowers the pressure, this pump operates with minimum stuffing box wear. Only 10% normal sealing water pressure is actually required . . . because Morris Type R stuffing box is subject to *suction pressures only*. Low line pressure is therefore sufficient to shut out grit effectively . . . and still protect the slurry from objectionable dilution.

If no other Type R feature were listed, here's one that says: Specify Morris. But there's even a bigger story. Ask for further information of this outstanding slurry pump, servicing scores of material handling applications.

OTHER MORRIS TYPE R FEATURES

- ✔ EASY TO INSTALL
- ✔ EASY TO DISMANTLE
- ✔ EASY TO MAINTAIN
- ✔ SIMPLEST DESIGN
- ✔ MINIMUM NUMBER OF WEARING PARTS

Specify **MORRIS Type "R" SLURRY PUMP**

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Branch Offices in Principal Cities

MORRIS Centrifugal Pumps

Minnesota *(Continued)*

the 1951 season ends, the ore coming from the three Michigan ranges. About Sept. 1 a 4,500-hp. triple-unit diesel locomotive was put in service between the Gogebic Range and Iron River, Mich. It handles 125 loaded cars and 200 empties.

★R. T. Elstad, president of **Oliver Iron Mining Co.**, told the Eveleth Junior Chamber of Commerce on Sept. 12 that great opportunities are in the making for Eveleth and other Mesabi Range towns. "The increase in labor requirements for taconite mining," he said, "is estimated to be three or four times that of present ore mining. For every additional miner, six more people will be added to the communities that serve the mines." . . . . "If jet-piercing should become the cheapest way to drill taconite, why shouldn't an oxygen plant be built right here? Why could not the grinding balls and rods, of which thousands of tons will be needed every year . . . . be distributed from this central location?"

★The new screening plant at the **Hill-Annex mine** at Calumet is designed to handle 900 tons of crude ore per hour. The crude ore will come from the recently stripped northeast area, where the plant is located, and from the stockpile of cretaceous material accumulated during the years Hill-Annex has been in operation. Changes have been made in the mill to permit handling low-grade stockpile ore.

★**Cleveland-Cliffs' Hawkins washing plant** is being dismantled, to be reerected at the pit edge. It dates back to 1912, two years after Oliver's Trout Lake concentrator was put in operation. During these 39 years crude ore has been hauled 2 mi. from the Hawkins pit to the washing plant by steam locomotives which are now almost obsolete in range mines. The Hawkins was formerly operated by International Harvester Co.

★Paul Zinner, regional director of the U. S. Bureau of Mines at Minneapolis, has announced that the personnel of the Bureau's North Central Experiment Station at the University of Minnesota has been increased from seven to twelve. One of the problems to receive extensive research will be that of recovering manganese and sulphur from low-grade Minnesota ores, particularly those of the Cuyuna Range.

★At the third meeting of the **Minerals Benefication** Sub-Section of the Minnesota Section, AIME, held in Hibbing, Sept. 26, E. H. Rose, research engineer for the Tennessee Coal, Iron & R. R. Co., of Birmingham, was the principal speaker. The attendance of about 85 included mining men from all the range communities. Mr. Rose said that treatment of the low-grade ores in the Birmingham district, when undertaken commercially, would probably follow much the same pattern as would be applied to the Mesabi non-

magnetic taconites. Attempts to treat the Birmingham ores would be made first, he believes.

★**M. A. Hanna Co.** reports that drilling for iron ore in the Wolf Lake area near Detroit Lakes has, so far, been disappointing. Overburden is found to be deeper than expected from the aerial surveys—running from 450 to 650 ft. of glacial drift. The surveys had indicated large ore deposits.

★**The three ore carriers,** each 647 ft. long, being built for the Pittsburgh Steamship Co. (U. S. Steel) will be named for three U. S. Steel directors: Philip R. Clarke, Arthur N. Anderson, and Cason J. Callaway. Two carriers are being built at the Lorain, Ohio, yards of the American Shipbuilding Co. and the third at Great Lakes Engineering Works, River Rouge, Mich. They are scheduled for launching late this year and will add 2,200,000 tons per year to the iron-ore carrying capacity of U. S. Steel's 61-vessel fleet.

MONTANA

★Goldfield Consolidated Mines of Reno, Nev., and San Francisco, in 1950 organized a subsidiary, **American Chrome Co.,** through which it has an equity of 66⅔% in a lease and option on the Mouat chrome property near Nye, Stillwater County, Mont. One-third of the lease and option is owned by individuals. It is reported that American Chrome Co. has applied to the Government for a $6-million loan to develop the Mouat chrome mine.

★**Ambassador Mines Corp.** has been awarded an exploration and development loan by the Government to diamond-drill its property in Sanders County, Mont., near the border of Idaho, according to President M. J. Unger, Santa Barbara, Calif. During the summer the company has extended its main tunnel nearly 200 ft. for a total distance of 1,850 ft. Surface showings expose good values in gold, silver, copper, and lead.

★**Mrs. Sarah L. Stratton,** the woman who promoted the first development on the McPhillips mining property in the Coeur d'Alenes and located the orebody in what is now the Dayrock mine, is developing the Treasure Mt. mine in Powell County, Mont. She has driven a new lower tunnel which opens the Treasure Mt. vein 100-ft. below the discovery level from where the former owner shipped enough ore to pay expenses. The new lower tunnel opening has been driven some 80-ft. on ore which averages about $68 per ton in silver, lead, zinc, copper, and gold. The ore is being stockpiled pending construction of a milling plant by the Denver Equipment Co.

★**GSA** announces that a depot has been opened at Butte, Mont., to which miners and producers may ship domestic manganese ore for inspection and purchase by the Government.

Arrangements are being made to

500 ton per day selective lead-zinc concentrator recently completed by Stearns-Roger at Deming, New Mexico

THERE'S **NO SUBSTITUTE FOR EXPERIENCE**

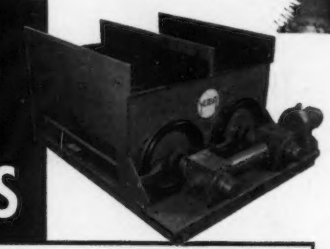
No matter what the size of the project, you can turn to Stearns-Roger with confidence—for undivided responsibility in a complete service including: engineering, designing, manufacturing, construction.

One over-all contract for the complete plant saves time and money. This type of contract, which Stearns-Rogers offers, has proved its advantages over a period of years and on a nation-wide scale. Satisfaction is evidenced by the volume of contracts we are handling, including repeat orders both for new plants and enlargements of existing plants.

Construction view of the flotation building with 30'x 20' thickeners in the foreground

YUBA Jigs on Biggs No. 3. Note compact arrangement.

INCREASE ORE RECOVERIES



with YUBA JIGS

1,000 CELLS IN USE FOR MILL CIRCUITS AND PLACER DREDGES

You can trap many ores and mill products with the YUBA Jigs that have proved so successful in the placer gold dredging industry.

Jig action can be closely controlled by reason of the wide range of stroke adjustments and pulsation frequency.

This flexibility makes possible the capture of finer particles and creates greater capacity and efficiency.

SAVE TIME, POWER, SPACE

YUBA Jigs are built to reduce labor costs and downtime. Operating features include:

Interchangeable drives for pulsators completely enclosed and splash lubricated.
Stainless steel stationary hutch valve.
Simplified stroke adjustment (¼" min., 3" max.).
Maximum frequency—400 at ¼" stroke.
Rubber seal between screen grids and basket.
Low power consumption—as low as 2 hp. for 4-cell unit.
Stainless steel screens—no rust, constant full openings.
Surface action evenly distributed over full area of basket.

Install YUBA Jigs in mills and dredges (new or old) to supplement existing equipment or to replace other recovery methods. They require minimum space and headroom; fit in most dredges without hull changes. Built in multiples of 2 or more cells as needed.

For information about adapting YUBA Jigs to your operation, send data on ore, feed sizes and present installation. No obligation.

YUBA DREDGES — PROVED DEPENDABILITY

YUBA MANUFACTURING CO.

Room 706, 351 California St., San Francisco 4, California, U. S. A.

AGENTS { SIME, DARBY & CO., LTD. · SINGAPORE, KUALA LUMPUR, PENANG.
SHAW DARBY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E. C. 3.

CABLES: YUBAMAN, SAN FRANCISCO · SHAWDARBCO, LONDON

41

Montana *(Continued)*

open another depot at Deming, N. M., in conjunction with the Government's five-year domestic purchasing program to encourage the discovery, development and production of manganese in the United States. The program is being operated by GSA for newly formed DMPA.

Jess Larson, administrator of GSA and DMPA, said that ore delivered at the Butte depot must contain a minimum of 12% manganese in order to be acceptable. Five long tons of ore is the minimum single delivery, and will be purchased only from miners or producers who have notified the Government in advance of their intention to take part in the program.

At Butte, prices paid for the ore will range from $6.05 per long dry ton for ore with the minimum acceptable 12% manganese content to $40.42 for ore containing 30%. GSA has contracted with the Domestic Manganese and Development Co. to sample and analyze the ore to determine its manganese content at the Butte depot.

★**The Nancy Lee Mining Co.**, operating the old King & Queen mine near Superior, Mont., reports finding the vein which a fault had cut off in the lower tunnel workings.

★**Commonwealth Lead Mining Co.**, Salt Lake City, operating a property east of Melrose, Madison County, Mont., has driven a winze which is still in the high-grade silver-lead ore opened in a stope last year.

NEVADA

★The **Chick Bed mine**, 22 mi. east of Fernley, is operating steadily with 16 men on the payroll producing diatomaceous earth from an open-pit operation. The product is trucked to the company's Fernley mill for processing, bagging, and sale directly to the trade.

★Development plans are being made at the Blossom mine in the Searchlight area following the uncovering of high-grade gold and silver ore. The Blossom has produced $900,000 of gold and silver values in the last eight years. **Searchlight Mining & Milling Co.** is the operator, with Homer G. Mills as president.

★Twelve men are at work at the Premier mine in King's Canyon northwest of Carson City. The Premier Mines Corp. has leased the property to the **Canadian-American Tungsten Corp.** at a reported price of $250,000. The new owners are mining copper ore and are milling on a custom basis tungsten ore from the Hopi claims south of Gardnerville.

★**William "Bob" Hunley** is milling lead-silver ore from his Star Peak mine in Star Canyon on the east side of the Humboldt Range. A 10-ton portable mill is being used, and the concentrates are sent to a smelter.

Hunley has been developing the property for the last ten years, and has constructed a road to the property which is near the 10,000 ft. level.

★**Goldacres Mine & Mill** in the Bullion district of upper Lander County, with 24 men in the mill and 17 in the open-pit mine, is treating 400 tons of ore daily in the 500-ton cyanidation mill on the property. Harry C. Bishop, Beowawe, is manager, R. B. Warmbrodt is mine superintendent, C. E. Stewart is in charge of the mill, and Floyd R. Hannaman is foreman. The mine is the property of the London Extension Mining Co.

★**The Golden Ensign** gold and silver mine in upper Elko County is now turning out tungsten ore. Four men are working underground and three on the surface. They are developing a main drift and repairing other mineways along the lime and granite contact. D. C. Despain, Mountain City, is in charge of the workings.

★Joe Riley, Reno, has taken over six mining claims in upper Brunswick Canyon, Douglas County, and is using a bulldozer and power shovel to try to determine the extent of tungsten ore that outcrops at several locations. Riley has the property on a three-year bond and lease arrangement from Julio Vargiolu and L. W. Little, both of Carson City.

★Two men are doing surface work and establishing camp facilities on a new tungsten discovery of **T. J. Niceley** in Jett Canyon, 50 mi. north of Tonopah. Niceley, a Nye County mining man, made the find on claims formerly owned by Louis Cirac, Bob Marker and George Barra, and bought it for cash.

★Six men, working at the Rip Van Winkle mine in Elko County, are daily hoisting 12 tons of ore mined by cut-and-fill. **United Minerals Reserve Corp.** took over the property several months ago, and plans to develop ores that are known to exist on the lower levels.

★At the **Rare Metals Corp.** Toulon mill in Pershing County, three men with a bulldozer and a truck are stockpiling perlite. The ore is being produced from the claims in the Cow Creek district, which Warren Petroleum Co. recently purchased from the Charles Chester family of Lovelock. Purchased at the same time were the family's tungsten claims in Black Canyon, of the Trinity Range district.

★**Calumet & Hecla Mining Co.** plans to rehabilitate the old King mine in Tonapah Development Co. ground as soon as necessary machinery can be assembled, according to company attorney, M. A. Diskin of Reno.

NEW MEXICO

★**Florida Mines, Inc.** started operating a new mill to process manganese at Deming. The company is buying

FREE BOOK

HOW RCA 2-WAY RADIO

SAVES TIME · SPEEDS OPERATIONS · "STRETCHES" EQUIPMENT

. . . tells in non-technical language what 2-way radio is and what it does . . . shows how it works. You'll see how management can know at all times what's going on because it has voice contact with roving crews and with men at remote locations.

. . . shows how RCA 2-way radio expedites materials handling, coordinates survey and construction projects, and eliminates aimless driving in tracking down trouble . . . It reports how 2-way radio is used to route cars and trucks, to mobilize repair crews fast, and to prevent disruption to production cycles.

. . . also covers the survey facilities offered by RCA to determine the 2-way radio system that best meets your business needs . . . includes a digest of the FCC rules regulating industrial radio service . . . reveals how to co-operate with industry's frequency allocation committees.

* * *

This brochure is yours for the asking. (*In Canada, write: RCA Victor Limited, Montreal.*)

2-WAY RADIO FOR INDUSTRY
FOR
OIL AND GAS INDUSTRY · PIPELINES
PUBLIC UTILITIES · TIMBER & LOGGING
MOTION PICTURE COMPANIES · NEWSPAPERS
CONSTRUCTION · MANUFACTURING · MINING
SPEEDY COMMUNICATION WITH ALL MEN AND EQUIPMENT

MAIL TODAY

RCA ENGINEERING PRODUCTS
Dept. 138 W,
Camden, N. J.

Send me a free copy of "2-way Radio for Industry."

Name_____

Firm_____

Address_____

City_____ State_____

RCA RADIO CORPORATION of AMERICA

at the working face . . .

GIVE 'EM AIR

Mr. Safety Engineer...

at the lowest possible cost!

SPIRATUBE-M and AYRTUBE cut Air Delivery Costs. Specifically for mine and tunnel ventilation, these two AIRDUCTS individually or in combination, deliver maximum of air right at the working face and at lowest possible cost—because—ease of handling reduces installation costs, and construction features minimize leaks and seepage. You get the full volume created by your fans and blower units right where you need it—at the working face—reducing power costs.

Available in tough high count jute and other fabrics, specially treated and heavily coated inside and out to withstand fungus and mildew and rough usage.

Flexible special (patented) built-in couplings eliminate fabric mangling—no parts lying about to create accident hazards.

SPIRATUBE-M—(DIA. to 30")

For both positive and negative pressure, or reversible systems. Replaces rigid ducts. Saves shipping, installation, maintenance, and storage costs. Patented concealed spring wire construction springs to work and stays extended. Built-in quick couplings with joints lock ringed against blast concussion. No fittings required for turns or bends.

AYRTUBE (DIA. to 36 in.)

Heavy duty pressure ventilation tubing without wire reinforcement. Quick coupling ends and lock rings interchangeable with SPIRATUBE-M. Full line of special fittings available.

▶ Immediately available from well-stocked distributors—Coast-to-Coast.

For Literature: Spiratube-M ☐ Ayrtube ☐

5-L-7 Write Dept. A-11

FLEXIBLE TUBING CORPORATION

MADE IN U.S.A.

SPIRATUBE *REG. U.S. PAT. OFF.

GUILFORD, CONNECTICUT, U.S.A.

Western Office: 416 Citizens Bank Bldg. Pasadena 1, California

New Mexico *(Continued)*

ores and also owns 32 mining claims about 9 mi. southeast of Deming. Ores in this district average 19% to 20%. The mill is designed to turn out 42% or better concentrates. It is understood the company has a contract to sell 6,000 tons of concentrates to the Government, and that on completion of that contract, an additional 10,000 tons will be contracted for. Edward Newton is in charge of the mill.

★With opening of a new port of entry between **Mexico and the U. S.** at Antelope Wells, N. M., **a flow of high-grade duty-free manganese ores** is coming into this country by truck. The importer is Lawrence Yacomo, of Lordsburg, who is selling to the Government at Deming. Previously the ores had to be hauled a greater distance to El Paso.

★Jack Knabel, representing **Anaconda Copper Mining Co.**, which is exploring uranium deposits west of Grants in conjunction with the Santa Fe Railroad's "Operation Haystack," has established offices at Grants, and is conferring with the Laguna Indian tribe on additional large uranium deposits recently discovered on their lands. The Laguna reservation is 30 mi. east of Grants, 46 mi. west of Albuquerque. When these two areas are being mined, Anaconda may build a mill near Grants.

★**Pumice Aggregate Sales Corp.**, Albuquerque, is shipping 100 cars of pumice aggregate monthly from its open-pit mines at Cochiti to El Paso for use in building an 800-unit military housing project. The housing will all be of the Normac prefabricated type. The building contract is held by Pumice Aggregate Sales Corp. Shortage of railroad cars is slowing down the company's shipments to other points.

★**The Navajo Tribal Council** plans to employ a mining geologist to make the first thorough mineral survey of their 16-million acre reservation. Since uranium deposits have been discovered in the northern part of the reservation and a mill to process them is being built on Indian lands near Shiprock, the main object of the search will be to find other ores now in demand, such as manganese, the rare earths, and kaolin. The tribe has also taken over all coal mining on the reservation.

★**William-Heim**, Corona, is operating a new mill designed to process bastnasite into principal concentrates of cerium and thorium. Carload shipments of these two are sold to Lindsay Light Corp., West Chicago, Ill. Heim has the only known deposit of bastnasite in commercial operation in the Western Hemisphere. The ores are hauled 14 mi. to the mill from the Gallinas Mountains. They are associated with high-grade fluorspar ore.

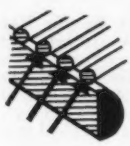
★From its new lead-barite mill at San Antonio, N. M., **Mex-Tex Mining Co.**

FASTER, BETTER DEWATERING

BEE-ZEE ROUND ROD SCREENS

Bee-Zee's faster, better dewatering makes more money for miners . . . prevents cold weather freeze-ups. More accurate sizing is another reward you earn by using Bee-Zee Round Rod Screens.

FINE POINT OF CONTACT



between round top and tie rods leaves no "pockets" to cause blinding or clogging. Water is removed quickly and thoroughly. Special alloy stainless steel resists rust, corrosion and hardest abrasive action.

BEE-ZEE ROUND ROD DESIGN

means that top rods can wear *half-way* through their diameters before screen opening changes in size. Built-in tension with all-welded construction strengthens screen against roughest pounding punishment.

WRITE FOR FREE CATALOG explaining all the features of Bee-Zee Screens and their use in mining work. No cost or obligation.

BIXBY-ZIMMER ENGINEERING COMPANY

Bee-Zee Screens can be fitted to any mining equipment.

5110 ABINGDON ST. GALESBURG, ILL.

is now shipping several carloads of lead concentrates monthly to AS&R's El Paso smelter. Mex-Tex's mine is at Bingham, 34 mi. from the mill. C. E. Jacobs is in charge of both mining and milling operations for the principal owner, J. E. Bishop of Houston.

★**Great Lakes Carbon Co.** has finished remodeling its perlite crushing and sizing mill at Socorro. Because of the newly opened market for fines, the company now plans to spend about $200,000 to recover and sort them.

★**Duval Sulphur & Potash Co.** plans to be in full production soon at its new potash mine near Carlsbad — the fourth producer in the district. **Southwest Potash Co.** has nearly completed surface installations; plans to be in production about July of 1952. **International Minerals & Chemical Corp.** has nearly completed the connection between its new No. 3 shaft and the No. 1.

NORTH CAROLINA

★**Newly incorporated for mica: Balsam Gap Co.** of Waynesville for 1,000 shares, no par value, subscribed to for $1,000 by William Medford, W. H. F. Millar, both of Waynesville, and Andrew Leith of Haverford, Pa. **Wilson Mica Corp.** of Spruce Pine, for $100,000, by Vernon Wilson, Roy Weld, and Frank Watson, all of Spruce Pine. **Industrial Mining Co.** of Spruce Pine, 140 shares, no par value, by Samuel Phillips, Robert B. Guy, Lewis Aldridge, and others.

★**Secretary of the Interior** Chapman has signed seven new DMA mica exploration contracts totaling $21,500.

★According to Arthur P. Hall, Pittsburgh, Pa., director of public relations for Aluminum Company of America, an aluminum extrusion mill, with cost estimated at $20-million to $60-million, is planned by the company for the Portland-Vancouver area. Alcoa's research in processing deposits of laterite from northwest Oregon is continuing.

★**Foote Mineral Co.** of Philadelphia, Pa., arranged to buy a lithium property near King Mountian, N. C., from the Solvay Corp. The reported price: $350,000.

Foote has operated the property under lease for several months, and has conducted extensive tests which included drilling to depths up to 6,350 ft. According to Fred Kelley of the Charles Blum Co., which handled the Foote-Solvay negotiations, the tests revealed the largest known source of lithium-bearing ore in the Western Hemisphere.

During World War II, Solvay developed the property as a source of spodumene. Foote proposes to double the staff and to produce tin as an important by-product of the lithium extraction.

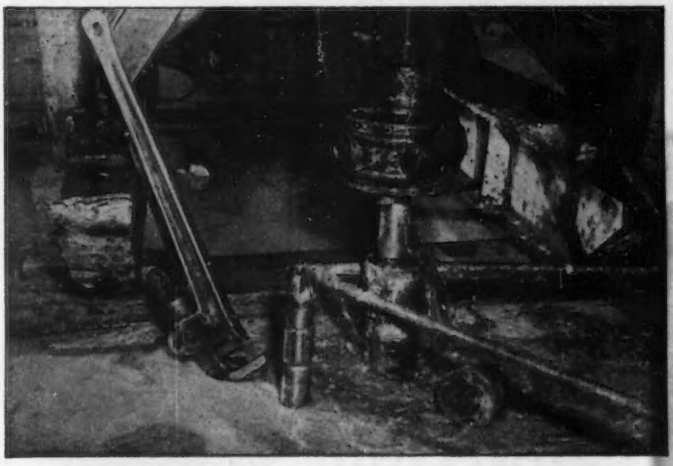
OREGON

★Oregon **mining activity now centers around chrome properties** in the southwestern part of the state. Construction has been stepped up on the Government's ore purchasing depot at Grants Pass. New equipment includes platform scales. Up to Sept. 15, more than 1,000 tons of chrome ore had been received at the station.

★A group of **mining men headed by W. S. Robertson** of the Oregon Chrome mine is exploring a large body of chromite in a new tunnel at Cyclone Gap 10 mi. south of the Oregon line in Siskiyou County, California. The tunnel has penetrated 30 ft. of chromite, and development ore is being hauled to the new Grants Pass purchasing depot.

★**Chetco Mining Co.** with properties in Curry County is building a road into the headwaters of Chetco River, has taken in two caterpillar tractors and a compressor, and expects to be shipping chromite ore from the holdings this fall. Chetco was formed by a group of Grants Pass men.

★A lease on more than 400 acres in Sumpter Valley in Baker County has been taken by a group of Eureka,



DIAMOND DRILLERS FIND "SECRET WEAPON" FOR LOW COST SEDIMENTARY DRILLING

Pictured above is another new field in which the all-purpose "Blue Demon" has no equal . . . grout hole drilling in sedimentary formations.

The fossiliferous Tampa limestone was too rough for diamond bits and other bits couldn't do the job. Hawthorne "Blue Demon" Rock Bits drilled the clay, heavy shale, limestone and even concrete . . . with more footage per bit, fewer bit changes and drastically reduced bit costs.

Hawthorne "Blue Demon" Rock Bits, famous for drilling 75% of the shot hole footage for the geophysical industry, are now being adopted by diamond drillers for their sedimentary and overburden drilling. They find "Blue Demons" non-shattering tungsten carbide facing most efficient for mineral prospecting . . . foundation testing . . . grout hole drilling.

Drillers on 900 drills throughout the world are drilling faster, with fewer bit changes, at drastically reduced drilling cost with long lasting Hawthorne "Blue Demon" Rock Bits.

Use "Blue Demons" for diamond bit efficiency at "fish tail" cost in sedimentary drilling.

- Mineral Prospecting
- Foundation Testing
- Grout Hole Drilling

HAWTHORNE "BLUE DEMON" ROCK CUTTER BITS REPLACEABLE BLADES

$1\frac{7}{8}$"-10"

PATENTS PENDING

WRITE FOR ILLUSTRATED CATALOG

HERB J. HAWTHORNE INC.

P. O. BOX 7346, HOUSTON 8, TEXAS

2607

Oregon *(Continued)*

Calif., men—I. S. Decker, Ward Hill, and Vanderjack—and testing on the gold placer project is under way in preparation for hydraulic work.

★Strategic Minerals, Inc., whose property is on Onion Mt., shipped two carloads of copper ore to the Tacoma smelter recently.

★Increased production at the **Bonanza mine**, which was recently reopened, is said to have been the chief cause for the rise during the second quarter of domestic production of mercury, according to a U. S. Bureau of Mines report. Mt. Jackson mine in California ranked first and Bonanza ranked second.

UTAH

★Discovery of shortite, a mineral not previously located in Utah, has been reported by Prof. Max P. Erickson, mineralogist at the University of Utah after a study of diamond-drill cores collected for the university's well-sample library.

Shortite is described as a double carbonate of calcium and sodium. The Utah occurrence is said to be the second known to science. The first find was in cores taken 20 mi. from Green River, Wyoming, while the Utah find was made in the Green River formation 7 mi. from Ouray, Utah.

★Three new Utah uranium discoveries have been certified for the special AEC bonus, according to announcement by the Atomic Energy Commission. The finds are reported on the Abe Day Vanadium Queen claim in the LaSal district of San Juan County, on the L. A. Sutherland-Socko claim in the Yellow Cat district of Grand County, and on the Eli Malich Lucky Day claim in the Yellow Cat district. The special bonus equals the basic payment per pound of uranium oxide in each ton of ore and applies to the first 10,000 lb. of ore containing 0.1% or more shipped since March 1, 1951.

★DMA has given approval to a $125,240 lead-zinc exploration program planned at the Harrington-Hickory mines in the Milford district. Harrington Mines Co., operating on lease from the New Majestic Mining Co., is spending $62,000 as the company share.

According to New Majestic president, Ray H. Barton, plans call for 1,630 ft. of drifting and crosscutting on the 600-ft. level of the mine in the northern section of the workings between the Harrington and Adelia fissures. Another 1,320 ft. of drifting and crosscutting will be done in the south sector of the mine at the 600-level between the Harrington and Copper fissures. New headings are already being driven. J. D. Williams is general manager of the operation.

★Jess Larson of GSA announced in Washington this month that a **"significantly large supply"** of critically needed **quartz crystal** has been located on the Goshute Indian reservation in Utah near the Nevada border. The find reportedly represents the first important strike of domestic quartz since the start of a new hunt for the material, vital to the manufacture of electronic and radio equipment.

WASHINGTON

★J. A. Hogle & Co.'s research department predicted in September that Pend Oreille Mines & Metals Co.'s output would be doubled in 1951 and quadrupled by 1953.

★**Activated Fertilizer Corp. of Washington**, after three appearances before the County Planning Commission, won approval of its plans to build a superphosphates plant in the Spokane Valley, near the Ace Sand and Gravel plant. A conditional permit was granted asking that the firm post proper bond to guarantee against damage by fluorine fumes to surrounding property.

★Construction of **Aluminum Company of America's** $50-million plant near Wenatchee is proceeding rapidly and at the present rate, the first potline could be in operation by July, 1952.

SO ... now we treat all LONG-LIFE TIMBERS with

OSMOSALTS and OSMOPLASTIC

the MINE PROVEN wood preservatives that make timbers last 3 to 5 times longer

Yes, in today's high priced timber and labor market, the cost of mine timbering has skyrocketed. You can cut this cost as much as 50% by using Osmose-treated timbers in all *Long-Life* places above and below ground. Osmose-treated timbers last 3 to 5 times longer and save not only the timber cost but also the LABOR cost of replacement.

Would you like to CUT YOUR *annual* TIMBERING BILL IN HALF? You can by making a negligible investment in Osmose materials and a simple layout for TREATING YOUR OWN TIMBER. Or, if you prefer, we can furnish you with all types of Osmose-treated mine timbers. Let us give you the details! Also, ask us about our new Mine Timber Mix!

Send for this FREE book!
"Force Down Your Operating Cost" is a new 16-page book that shows and tells all about Osmosalts.

OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.

1437 BAILEY AVE., BUFFALO, N. Y. Branches: DENVER, COL. and BIRMINGHAM, ALA.

More than 1-million cu. ft. of dirt have been moved for the reduction plant. Concrete has been poured for the BPA rectifier at the site. A plant for manufacturing concrete is ready to furnish 60,000 yd. of concrete for the rectifier plant.

★In order to effectively control and neutralize all smoke and fumes given off from the Mead plant, the Kaiser Aluminum & Chemical Corp. announced it will spend "more than $4-million" installing equipment. The work will begin this fall. It was reported that the company had expended about $250,000 in study and experiments.

★The supply of interruptible electric power which was cut off Sept. 17 from the Pacific Northwest aluminum industry because of the dry season was restored on Oct. 1, by Bonneville Power Administration and was to flow to potlines at least until Oct. 21, when the situation was to be re-examined. Two of the aluminum industry's 18 potlines in the area were shut down, one at Kaiser's Mead plant and the other at ALCOA's Vancouver plant.

★The orebody of the Reeves-MacDonald Mines, Ltd. shows "remarkable uniformity" through a vertical range of nearly 1,000 ft., according to a report by the B. C. Department of Mines. There is little difference in character of ore among several of the upper 50-ft. levels. The average length of the main orebody is 350 ft., with a width of 70 ft. and thickness of 40 ft. During August production was 29,000 tons, up from an average of 22,000 tons per month during the final quarter last year. The company is tax exempt until 1952.

★Tungsten Mining & Milling Co. started operating the rehabilitated 300-ton mill at the famed Germania mine near Fruitland in September. Concentrates are being turned out from the old dumps, and it is estimated that there is 300,000 tons or a three-year supply for the present mill on a three-shift basis. It runs about 3½ lb. tungstic acid to the ton. Because tungsten is on the strategic list, the company has applied to the RFC for a $75,000 mill construction loan. A search is being made for new bodies of wolframite. Henry Becker, who has acted in some capacity with every ownership and management of the mine, is the mill superintendent for the present company. Paul H. Casey, of Spokane, is president and manager.

★Activity increases in the Twisp area where Alder Gold-Copper Co. has been producing nearly 200 tons of ore daily. On an adjoining property George Gibson, of Twisp, and John Russel, an Arizona mining man, are developing a gold-silver vein on Alder Gulch. Development work has been under way at the Copper Glance mine, on Eight-Mile Creek.

★Kaiser Mining Enterprises, Inc. filed articles of incorporation at Olympia in September with capitalization listed as $100,000. Alfred E., Monte E., and Arthur E. Kaiser were listed as incorporators. They are all of Yakima.

★Talisman Mining & Leasing Co. matched DMA's $22,000 loan and set to work replacing the ⅝-in. cable on its aerial tram with ⅝-in., and has scheduled R. S. McClintoch of Spokane for a diamond-drilling program when the tramway is completed.

★Spokane-Idaho Mining Co. is to operate the old Cleveland lead mine, in the Huckleberry Mts., 8 mi. east of Hunters, on a 50-50 profit-sharing lease, under a 10-year renewable lease from Stuart Compton, of Bayview, Idaho, and Walter Johnson of Davenport. A crew of four from the company's Constitution mine in northern Idaho, started work in September rehabilitating the 1,500 ft. main tunnel. A 65-ft. winze will be cleared and diamond drilling started at a 35-ft. depth station.

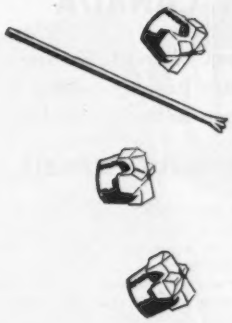
WISCONSIN

★Vinegar Hill Zinc Co., Shullsburg, Wis., is preparing to sink a shaft into a new orebody on its Mulcahy lease 4 mi. southwest of Shullsburg. Drilling on the Mulcahy to date has proved 150,000 tons of ore averaging 6.4% metallic zinc with minor amounts of lead. The shaft will be 6½ x 13 ft. and

This NEW Bulletin is your key to

REDUCED DRILLING COSTS

with...



A shank steel suitable for fast detachable bit drilling in hard formations with minimum bending and breakage . . . a conventional drilling steel easily sharpened and requiring fewer trips to the mine steel shop . . . either or both of these may mean important savings in *your* operation. That's why you should investigate the advantages of these fine ATLAS products:

Atlas Ottawa and Atlas Vibresist Hollow Drill Steels for conventional drilling; Atlas Chippawa and Nushank Hollow Drill Shank Steels for detachable bit drilling; Atlas Solid Drill Steel for hand steels, scaling bars, etc.; and Atlas Detachable Bit Steel, made to suit individual bit designs.

ATLAS MINING STEELS

Write (on company letterhead, please) for valuable free technical bulletin on Atlas Mining Steels. Address:

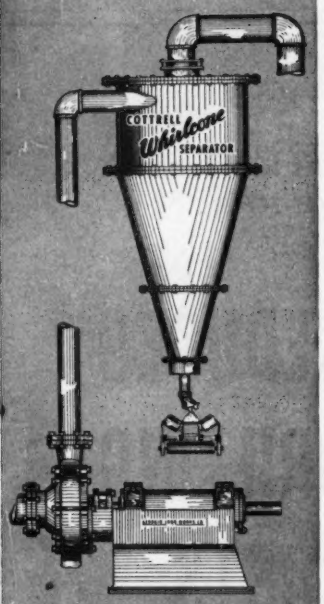
ATLAS STEELS LIMITED, Welland, Ont.

Offices and Warehouses at: Montreal, Toronto, Hamilton, Windsor, Winnipeg, Vancouver.

NOW, YOU CAN RECOVER YOUR FINES WITH THIS

COTTRELL Whirlcone SEPARATOR

PAT. PENDING



This WHIRLCONE rubber-lined separator is the simplest and most efficient method of separating fines ever invented. Every one sold bears its own testimonial. Write for further information and prices.

The 4" slurry pump pictured is the famous Georgia Iron Works slurry. These pumps are made in sizes from 2" to 14".

GEORGIA IRON WORKS CO.

Marbury Street, Augusta, Ga.

Exclusive U. S. A. Representatives

Wisconsin (*Continued*)

will be sunk to a depth of 230 ft. to the horizon known locally as the clay-bed. Ore will be hoisted through this shaft in 1,250-lb. cans, and hauled to the 900-ton flotation plant 2 mi. farther south of Shullsburg.

Now Vinegar Hill Zinc Co. mill is operating mainly on ore from their Blackstone Mine and the gravity-milled concentrates from the Andrews Mine of the Cuba Mining Co., 2 mi. to the west. Lesser amounts of ore are being processed from the Little Mullen Mine 1 mi. west of Shullsburg. Whitechurch and Farr, who operate the Little Mullen, are in the process of expanding their operations.

★**Meekers' Grove Mining Co.** has started operation of their flotation mill 5 mi. northeast of Cuba City. Lack of water causes one shift to operate the gravity mill and the next shift to operate the flotation unit. A new pump is being installed to provide sufficient water to run the entire plant at one time.

The Liberty Mine was reopened by the company in June, 1951 during completion of the flotation mill and in addition to current production, a considerable quantity of raw ore has been stockpiled for future milling. The Dall Mine has been reopened by the Dall Brothers, whose ore is being milled at the Meekers' Grove Mill.

IN CANADA

Inco, Sherritt, Barvue Show Progress—New Mines Open in B. C., Ontario

BRITISH COLUMBIA

★A recommendation that the B. C. Industrial Conciliation and Arbitration Act be amended to prohibit Communists from holding office or representing any labor group in collective bargaining was made by **Consolidated Mining & Smelting Co.** in a brief to a special legislative committee holding hearings on operations of the Act. Specifically, the company proposed: 1. a non-Communist affidavit be required of all union officers; 2. right of companies to make public statements on labor relations to their employees be protected; 3. provision that certification votes may be initiated either by the company or 25% of the employees.

★**Several large U.S. companies** are exploring British Columbia for base metals, mainly copper. Officials of the B.C. & Yukon Chamber of Mines report extensive exploration programs under way throughout the summer, with the firms looking mainly for large producers. Companies conducting investigations in B.C. include Kennecott Copper Corp., through its subsidiary Kennco Explorations (Canada) Ltd., American Smelting Co., Newmont Mining Corp., and New Jersey Zinc Co.

★Milling has started at the 100-ton plant at **Dorreen mine**, west of Hazelton; and **Van Roi Consolidated** began crushing at its new 100-ton mill at Silverton in the Slocan. Transcontinental Resources Ltd. acquired control of the Van Roi operation a year ago, and proceeded with plans for the Heavy-Media Separation plant and 100-ton mill, but no outside work could be done before April of this year. At Dorreen start of production followed building of a 2,600-ft. aerial tramline and a completely new camp at the millsite. Direct water is a factor in low costs. Exploration will start shortly on a base metals vein carrying promising lead and zinc values with silver content.

★**Columbia Lead and Zinc Lines Ltd.**, plans a 100-ton mill at its property near Revelstoke. The property has tungsten and other base metals. Operations will be concentrated on preparing the fifth level orebody for production. This orebody will provide at least enough ore from between the fourth and fifth levels to supply a 100-ton mill for 2½ years. The company hopes to start production this winter.

★Production is expected to start before the end of the year at **Kootenay Base Metals**, near Fort Steel. A 60-ton mill, bunkhouses, and roads are being constructed at the property on Wild Horse Creek. Ore will be trucked from the mine to mill, and the concentrate will be trucked to the railway for shipment to Trail.

★**Vananda Mines (1948) Ltd.** has let a contract for driving a crosscut an estimated length of 1,000 ft. from the sixth (lowest) level of the Little Billie mine, Texada Island, to Copper Queen mine, also owned by Vananda. The crosscut is expected to reach the Copper Queen about 12 ft. below the bottom of the deepest winze. Old records show good gold value and about 6% copper at that horizon. Vananda is shipping ore to the Tacoma smelter at the rate of 1,000 tons weekly.

★**Reeves Macdonald Mines Ltd.**, operating in the Nelson division, set a new monthly production record of 29,000 tons in August, compared with an average of 22,000 tons per month during the company's final quarter last year. The mine's new equipment has enabled the company to maintain one of the lowest production cost records on the continent, with operating costs averaging $3.21 per ton for the fiscal year ended last Dec.

★Also setting a new production record was **Kootenay Belle Gold Mines Ltd.**, which produced a smelter value of $105,000 in August compared with $56,000 in July. The company's new

Richmond-Eureka Heavy Media plant is producing up to 120 tons a day of sink, and fines averaging from $30 to $40 per ton. Ore from development drifts and stopes in the Whitewater, Altoona, and Monitor mines is expected to maintain full operation during the winter.

★A miniature airlift is being used to speed work of diamond drill crews at the **Quatsino Copper Cold Mines Ltd.** property on Elk River, Vancouver Island, with supplies being dropped by parachute. Drilling has substantially increased proven and indicated iron ore reserves over the 542,000 tons previously estimated.

★Production of high-grade asbestos is being planned from a new mine in northern B.C. **Cassiar Asbestos Corp.** is reported to be designing a mill with an initial capacity of 250 tons daily on its recently-acquired property just north of McDame Creek, 70 mi. by road from Mile 648 on the Alaska Highway.

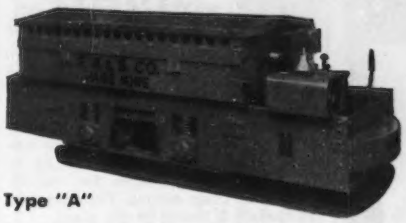
★**Western Uranium Cobalt Mines, Ltd.** expects to obtain more revenue from the tungsten content of its ores than from any other source when milling is commenced next month at the Rocher de Boule mine near Hazelton. Investigation of the tungsten occurrences has shown greater continuity and better grade than expected. The 200-ton mill will produce a tungsten concentrate and a second concentrate containing gold, silver and copper. Estimated grade is 0.2 oz. gold, 4.0 oz. silver and 4.1% copper.

★Development of the zinc-copper property of **Copper-Ridge Silver Zinc Mines, Ltd.**, in the Omineca division, is being financed by Transcontinental Resources, Ltd. Twelve different mineralized zones have been found on the claims to date. In the Ruby section of the property at Walcott, near Telkwa, former operators traced the ore zone for 3,300 ft. by intermittent open cuts, shallow drifts and natural outcrops, and drove 3,775 ft. of tunnel and one 56-ft. shaft on the Copper Crown showing. Recent surface drilling has indicated an orebody 800 ft. long to a depth of 150 ft. estimated to contain 247,636 tons averaging 0.846 oz. silver per ton with 4.653% zinc and 0.396% copper over 22.7-ft. width.

★**Waddington Mining Corp.** has optioned a group of claims on the west coast of Vancouver Island, at Clayton Lake, near the head of Herbert Arm. The claims have an outcropping of high-grade magnetite iron ore. Assays show 64.4% iron ore with 5.5% silica, 0.05% sulphur, 4.37% aluminum oxide, 0.10% magnesium oxide and 0.02% copper, plus small amounts of other minerals.

★A new mineralized area has been found in one of two newly discovered veins on the **American Standard Mines Ltd.** property near Hazelton. The vein on the south slope of Nine-Mile Mountain pinched out in the north, but was traced 400 ft. south into a

ATLAS LOCOMOTIVES HAVE THAT EXTRA



Type "A"

QUALITY FOR DAY AFTER DAY OPERATION

The Atlas Type "A" is an economical, trouble-free locomotive for main line haulage.

Top production schedules can always be maintained with these rugged heavy duty locomotives. Type "A" is equipped with the famous Atlas Double-Reduction Spur Gear Drive insuring ever efficient operation.

ATLAS ENGINEERING SERVICE IS ALWAYS AT YOUR SERVICE

Canadian Representatives: Mine Equipment Co., Kirkland Lake, Ont.

International Agents & Machinery Co. Ltd., Vancouver, B. C.

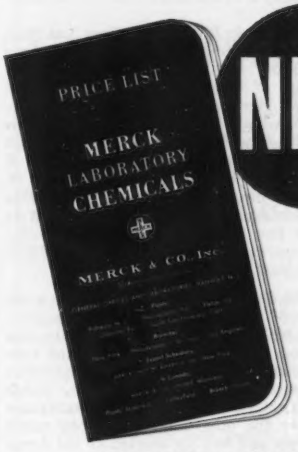
Universal Mechanisation Company (Pty.) Ltd., 7, Kruis Street, Johannesburg, South Africa

Complete details and specifications on request.

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO



NEW

AVAILABLE NOW!

Send for Your Personal Copy Today

This 1951 edition of the *Merck Laboratory Chemicals Price List* is filled with up-to-date, practical information on the purity and packaging of over 600 Merck Reagent and Laboratory Chemicals. *Specifications given for all Reagent Chemicals have been amended to conform to the latest revisions of ACS purity standards.*

Your local laboratory chemicals distributor has a copy for you. Or write us directly, using the coupon below.

MERCK LABORATORY CHEMICALS

MERCK & CO., Inc.

Manufacturing Chemists

RAHWAY, NEW JERSEY

In Canada: MERCK & CO. Limited—Montreal

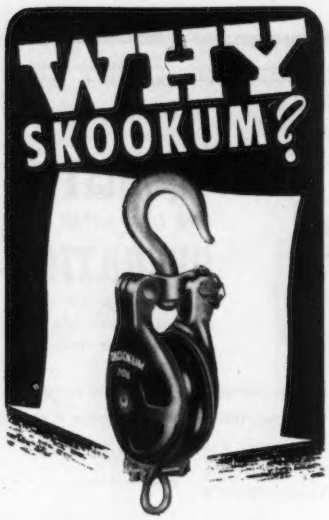
MERCK & CO., Inc.
Rahway, New Jersey, Dept. EM-11

Please send new 1951 *Merck Laboratory Chemicals Price List:*

Name.....
(PLEASE PRINT)

Street.....

City.....Zone.....State.....



...here's why

Yes...here's why each quarter Skookum adds from one to half a dozen new mines to the list that specifies Skookum Blocks exclusively

Here's why...Because Skookum bearings are PERMANENTLY sealed against mud or moisture.

Here's why...Because Skookum's patented grease seal keeps the lubricant on the bearings. It can't work out. Dirt can't squeeze in.

Here's why...Because Skookum's special manganese steel sheaves reduce line wear to an absolute minimum.

Here's why...Because the best steel and precise heat treating in electric ovens results in phenomenal strength per pound of material.

Here's why...Because at one mine Skookum Slusher Blocks stayed on the job 15 years without failure. News gets around.

• • • • • • •

BLOCKS BUILT TO YOUR NEEDS

Refer to pages F1-F4 in the 1950-51 McGraw-Hill Mining Catalog Service.

SKOOKUM CO. INC.
8504 N. Crawford, Portland 3, Ore.

British Columbia (*Continued*)

swamp where the mineralized area was found under 15 ft. of overburden. To date the area has been exposed for about 50 ft. showing widths of 2 to 4 ft. with metal content estimated to average 25% in combined silver, lead and zinc.

★**Carnegie Mines, Ltd.**, operating the Silversmith property at Sandon, with the opening of new ore on No. 5 level, plans to step up the 125-ton mill to 200 tons. Arrangements are under way with six other mines in the Slocan mining area for custom milling of their output. They propose to operate a Heavy Media plant.

★Real production news is in the offing at the Onek mine, it has been reported, where progress of as much as 300 ft. per month is being made in a drive below old levels at the property near the bottom of Keno Hill, by **United Keno Hill Mines.** A plant is being installed near the portal with the adit reported to cost $50,000. Reserve Mining Co., which was formerly interested with the Keno company in the Onek, sold its interest in 1950, for 50,000 shares of United Keno Hill stock. It is presumed that at the beginning of production ore will be trucked to the Elsa mine.

MANITOBA

★**Callinan Flin Flon Mines** has purchased control of **Transnorthern Nickel and Copper Mines** located east of the Cuprus mine of Hudson Bay Mining & Smelting, and has acquired a block of shares in **Le Pas Flin Flon Mines** adjacent to the main Hudson Bay property on the east. A contract has been let for 10,000 ft. of drilling on the ground in the Flin Flon area. Five anomalies outlined on Le Pas Flin Flon ground by an electromagnetic survey will be drilled as part of the contract.

★**Sherritt Gordon Mines** reports a net profit of $386,632 for the quarter ended June 30, 1951. Most equipment from Sherridon is going to the new nickel mines except the headframe over the inclined mainshaft, which cannot be used. The steel headframe over the other shaft has been taken down and will be erected at the Lynn Lake "EL" shaft.

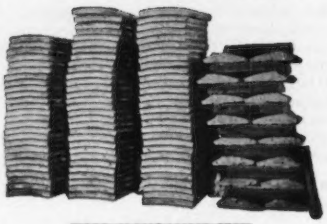
At **Lynn Lake**, the preparation of the "A" shaft orebodies for mining occupies a full crew underground.

NEWFOUNDLAND

★First indications secured underground by **Independent Mining Corp.** on its property at York Harbor point to possibilities of developing a copper-zinc producer. Four of the six levels of the old workings have been

TISCO MANGANESE STEEL

for maximum resistance to impact and abrasion



TISCO MANGANESE STEEL
BALL MILL LINERS

TAYLOR-WHARTON, pioneer in the manufacture of high quality Hadfields Manganese Steel Castings, has maintained its top position for nearly two generations by proper design of castings, accurate control of process, and careful attention to customer requirements.

TISCO Manganese Steel is widely used for wearing parts in digging, dredging, crushing, grinding, pulverizing, conveying and similar equipment.

Specify "TISCO" when ordering new equipment or replacement parts from your supplier.

TISCO MANGANESE STEEL
ROLL SHELLS FOR CRUSHING ROLLS

Also Manufacturers of Other Alloy Steel Castings to Your Specification, Special Trackwork, and Seamless High Pressure Gas Cylinders.

TAYLOR-WHARTON
IRON & STEEL CO.

High Bridge, N. J. • Cincinnati, O.
Easton, Pa. • Birmingham, Ala.

FOUNDED 1742

pumped out, and new lateral work will soon be in progress.

Inactive for almost 40 years, the property is having its first test since 1912. Prior to that time the previous owners shipped some 30,000 tons of ore grading 2.59% copper and 9% zinc; while approximately the same amount was left in sight when operations were suspended. In those days the zinc was an undesirable product. The new company plans to extend the old workings and give the surrounding property a thorough test.

ONTARIO

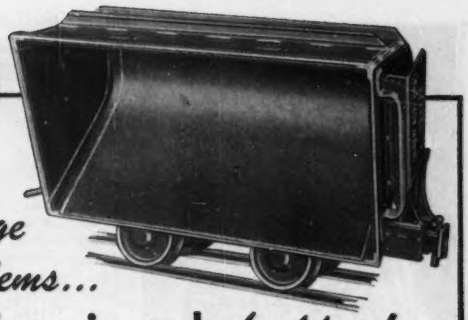
★The $100-million job of transition from open pit to underground mining is going well on schedule at the mines of **International Nickel Co.** at Sudbury. By 1954, when the big Frood-Stobie pit is exhausted, underground mining capacity will be at the rate of 65,000 tons daily, or 13-million tons annually. At present about 10-million tons is being mined each year, but underground mining will make it possible to include a large amount of lower-grade material.

Inco's two biggest mines are the Frood-Stobie and the Creighton. The former, operating the famous pit from which 60-million tons of nickel-copper ore has already been mined, will have an underground capacity of 35,000 tons daily. The Creighton, which has produced continuously since 1901 and yet shows no signs of exhaustion, will contribute 12,000 tons daily. This ore will be treated at the new Creighton concentrator and the product then pumped 7 mi. through pipe to the Copper Cliff smelter. The Garson, Levack, and Murray mines, each smaller by Inco standards yet big mines by any other, will supply the remaining tonnage required, with capacities from 4,000 to 6,000 tons daily.

★**Steep Rock Iron Mines** is headed for a new production record this year. Iron ore shipped will probably amount to 1.3 million tons, an increase of 100,000 tons over the previous record established in 1950. Profits should be well maintained, due to higher iron prices, though labor and freight increases have largely offset their benefit.

★There should be good news for **Dome** and **Campbell Red Lake** shareholders when the story of Campbell's 1951 development is told in the annual reports next spring. Dome's Red Lake subsidiary has opened up an orebody that is virtually a new mine. It is in new territory, although only about 500 ft. from the shaft. Traced from surface right down to the 7th or bottom level at 1,000 ft., the new orebody appears to have a potential of 250 tons per vertical foot, with grade well above mine average at more than $20 per ton. Production and profits will make pleasing reading, too. Last year's output of $2.25-

DUMP your haulage problems... on Experienced shoulders!



CARD CARS are engineered to combine operating ease and speed with rugged build that can take severe service.

Furthermore, they are engineered to meet specific conditions in YOUR mine!

Ask for Bulletin RD-1

C.S. Card Iron Works Co.

Denver 1, Colorado

KENNAMETAL Inc.

BUYS TUNGSTEN CONCENTRATES

COBALT • COLUMBITE • TANTALITE

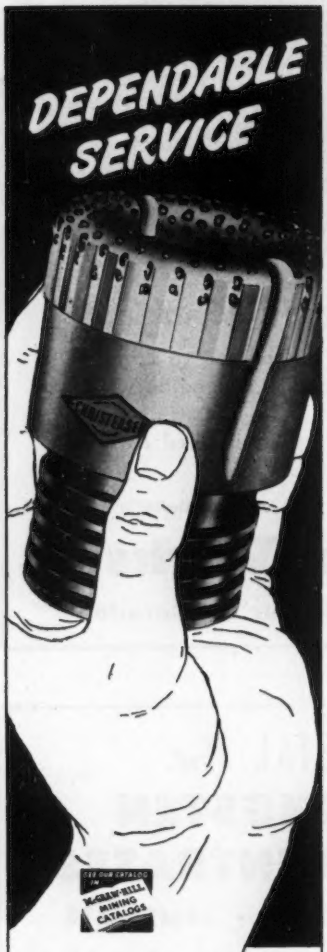
Prompt, businesslike settlement by private tungsten user and dealer secures you the best results. Cash advance against shipments. Scheelite, wolframite, hübnerite, ferberite, and cuproscheelite concentrates, middlings, and ores 20% to 60% WO_3 or higher purchased. Superior refining processes enable us to utilize lower-grade products and thus to minimize penalties.

Offers received at the nearest division of Kennametal Inc. Write, telegraph, or phone:

- In British Columbia, Yukon Territory, Washington, Oregon, Idaho, Montana:
  Pacific Northwest Exploration & Mining Div. of Kennametal Inc.
  609 Colman Building
  Seattle 4, Wash.
  or
  c/o Kennametal of Canada Ltd.
  Blanshard & Caledonia Sts.
  Victoria, B.C., Canada
- In California, Arizona:
  Consolidated Tungsten Mine, Div. of Kennametal Inc.
  1739 Terrace Ave.,
  Fresno 3, Calif.
- In Nevada:
  Nevada Scheelite Div., Kennametal Inc.
  543½ So. Taylor St.
  Fallon, Nevada
  Phone: 425-W
- In Foreign Countries, Eastern Canada, Eastern U.S.A.:
  Kennametal Inc.
  Latrobe, Pa., U.S.A.

KENNAMETAL Inc., Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES



Direct from the manufacturer to you . . . Christensen Diamond Bits are designed to meet the strenuous demands of present day core drilling jobs.

Christensen's staff of Field Engineers are constantly on the job to give you the necessary service and assistance where needed.

LESS COST PER FOOT CHRISTENSEN DIAMOND PRODUCTS

CHRISTENSEN
DIAMOND PRODUCTS CO.
1937 SOUTH 2nd WEST
SALT LAKE CITY, UTAH

Ontario *(Continued)*

million and profits of 14¢ per share should be topped easily, for daily tonnage milled has been increased from 400-500 tons with little diminution of grade. Output for 1951 will likely be $2.5-million.

★**New Morrison Mines,** formed last spring to revive the long inactive Morrison and W. J. Nine silver-cobalt properties in Gowganda, is starting shipments of high-grade ore to the Deloro refinery. The ore comes from two short but high-grade shoots developed years ago before low metal prices forced closing.

★**Cochenour Willans Gold Mines,** Red Lake veteran, is having a good year in which production and profits are comparing well with those of 1950. Earnings of the first eight months were sufficient to cover the 8¢ dividends which have already been paid, and those for the whole year will probably not be far from the record 14.2¢ earned in 1950.

QUEBEC

★The shaft at **Rainville Copper Mines** has reached its initial objective at 420 ft. and lateral work is getting under way on the 150,275 and 400-ft. levels. The property adjoins Golden Manitou in the Bourlamaque area, and the three-compartment shaft was sunk on the No. 4 zone, where good indications of copper were secure in extensive surface drilling.

★The big expansion program of **Lamaque Gold Mines** also in Bourlamaque is coming along on schedule. Daily milling rate should be up to the projected 2,000 tons early in 1952, and shaft-sinking at the No. 2 mine, about a mile northeast of the original operation and close to the Sigma boundary, will be down to its first objective at 1,335 ft. by 1952. The No. 2 mine is on the known extension of Sigma ore structure and has important potentialities for the future of Lamaque, which is already the largest straight gold producer in Quebec.

★**Barnat Mines** is now hoisting ore through its No. 3 shaft, to make the near completion of the big program through which the North zone will become the mine's main ore source. The shaft was deepened last year from 750 to 1,450 ft., a modern new headframe and mining plant have been installed, and plans call for the opening of four new levels on which to develop fully the 2.5-million tons of ore that are indicated. While nothing official has been said, the company's long-range plans are based on thoughts of increasing production well beyond the present 700 tons being milled daily.

★Promising zinc values have been secured in drilling by **Tache Lake**

WEIGH WITHOUT STOPPING
WHILE YOU **CONVEY**

Yes, weigh and record with the —MERRICK

WEIGHTOMETER

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designated point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service.

Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

MERRICK SCALE MFG. CO. PASSAIC N. J.

Male or Female Thread

Recognized Universally as the ULTIMATE in Valves and Couplings

KNOX MANUFACTURING CO.
222 W. Clinton Ave. Oaklyn, N. J.
SINCE 1911 PRODUCERS OF
KNOX
Valves - Couplings - Nipples - Clamps - Manders

Mines on its property at Lake Antoinette in the Chibougamau area, with gold and silver also in evidence. No averages can be reported yet, but the shoot which on surface had a length of 400 ft. has been proved for at least that length in drilling. Typical of the results was Hole 5X, which intersected 11.0 ft. assaying 14.25% zinc, 0.53 oz. gold, and 2.11 oz. silver. The company is controlled by O'Leary Malartic Mines.

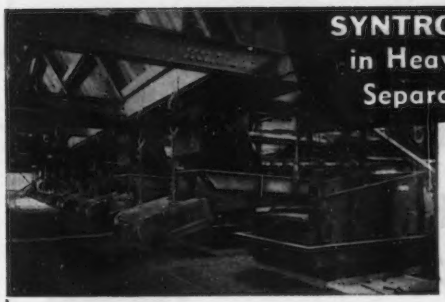
★Shaft-sinking is well in progress at the Barraute area property of **Pershcourt Goldfields**, adjoining the **Barvue Mine**, where plans for open-pit mining of the big low-grade zinc-silver orebody are materializing steadily. Pershcourt's three-compartment shaft will be sunk to 550 ft., with first levels at 300 and 500 ft. Pershcourt's ore is in the northwesterly extension of the Barvue zone. While values are about equal, widths are much less than those of Barvue, but the Pershcourt management is confident that a profitable mine can be developed underground in the indicated ore. The belief is also held that the wide Barvue ore will move into Pershcourt ground.

★Three companies are now drilling on favorable ground a short distance south of the Barvue on the border of Barraute and Piedmont twps: **Mogador Mines, Barvalle Mines,** and **Tasmaque Mines.** Considerable excitement was aroused when Mogador encountered zinc-silver values in cross-section drilling. The two other companies, with ground adjoining, have started probing for the westerly extension.

★**Anacon Lead Mines,** lead-zinc producer in Portneuf Co., 70 mi. west of Quebec City and 27 mi. north of the St. Lawrence River, plans to enlarge its mill capacity by 40% to 1,000 tons daily. The purpose is to treat ore on a custom basis from the adjoining properties of Montauban Mines and United Lead and Zinc Mines. All three companies are controlled by the same management, and all are working on the same zone. Anacon is already a profitable producer. Montauban and United Lead are still in the surface prospect stage, but substantial tonnages of low-grade ore have been suggested for both by drilling. A shaft will be sunk this winter for their joint development.

IN AFRICA

★Barring some requirement of domestic policy, there is now no reason why South Africa should not sell its gold in any of the world's free markets it chooses. This condition, long sought by the South African Government arises from the International Monetary Fund's recent decision to allow such sales freely. For more than a year, South Africa has sold some of its gold in free markets "for industrial and artistic purposes," and



SYNTRON Feeders in Heavy-Density Separation Plant

A battery of eight model F-55 Vibratory Feeders under a 1500 ton Surge bin feeding diamond-bearing "blue-ground" of minus 1-in. and oversize float recirculation of minus ¾-in. at controlled rates up to 64 tons per hour—to double deck primary washing screens.

SYNTRON

"Vibra-Flow"

VIBRATORY FEEDERS

Will handle most types of bulk materials—fine lumpy, abrasive—hot or cold—dry or damp—to crushers, mixers, belt conveyors, driers, ball mills, reverberatory furnaces, etc.

Syntron Feeders provide a controllable, variable flow of material that ranges from a trickling dribble to a gushing torrent.

Exceptionally low maintenance cost due to absence of motors, belts, chains, sprockets, cams, etc.

Write for catalog data.

SYNTRON COMPANY

510 LEXINGTON HOMER CITY, PA.

TWO MESCO HEADLINERS for greater Safety and Efficiency

MESCO Hydraulic Brake Adjustor

Adaptable to most locomotives. Motorman can adjust brakes quickly—anywhere at any time—with grease gun using any standard grease. No threads to rust, strip, or wear... no chance of sudden release of braking power. Available in any length from 10" rod centers up. Can be furnished with tubular grease extension for closed type frames.

MESCO Shock Absorber

"Dead ends" cables and allows for slack when connecting cables to junction boxes or other sources of power. Spring takes up sudden jerks which might snap cable. Equipped with four bolt clamp (illustrated) for use on shuttle cars, or with hinge type clamp for use on other mine machinery. Can be securely bolted to roof or chained to timbers or rail. Recommended for use on electrical, hydraulic, or clutch driven reels.

For information, see your nearest distributor or write direct.

MOSEBACH ELECTRIC & SUPPLY CO.

1117 Arlington Ave., Pittsburgh 3, Pa.

HEmlock 1-8332

A complete line of track and trolley products, including famous MESCOWELD Rail Bonds.

Smelting on Site

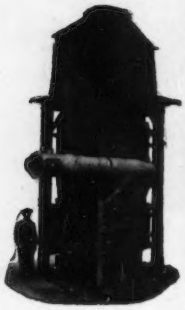
with

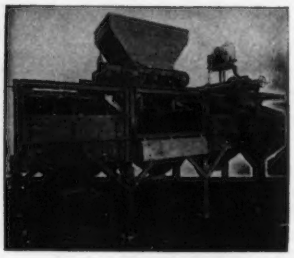
MACE Furnaces

and

Sintering Hearths

Saves high transportation and treatment charges on your ores and concentrates.





Wire or write for new catalog.

Standard sizes 5 to 250 tons capacity. Working scale tests on ton lots or larger made at our Denver Smelter. Send us an analysis for preliminary report.

The Mace Company

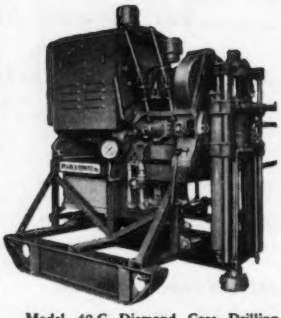
FIRE CONCENTRATE METALLURGISTS

2763 BLAKE STREET, DENVER 5, COLO., U.S.A.

MODEL 40-C

The Best Machine for Most Core Drilling Jobs

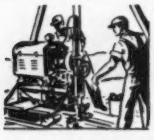
This is our latest model—designed for highest possible percentage of good core recovery on jobs up to 1000 ft. in depth (⅞" core) no matter how severe the operating conditions. Rugged construction, liberal use of alloy-steel parts and anti-friction bearings throughout, permit long periods of high-speed drilling at minimum expense. Other modern machines and a complete line of improved accessory equipment provide for every drilling and sampling requirement. Write for catalog.



Model 40-C Diamond Core Drilling Machine, with Gasoline Engine Power Unit and Oil-Operated Hydraulic Swivelhead.

CONTRACT DRILLING

Besides being manufacturers we are one of the oldest and largest contractors for any type of Core Drilling, including Grout Holes and Grouting. Sixty years of successful experience, superior equipment and ample financial resources, assure satisfactory results. Estimates submitted promptly on request.



"TRUCAST" BORTZ DIAMOND BITS

have proved their superiority for years in all types of rock formation. Available in a wide variety of standard and special types ranging from 1½" to 7¾" in diameter. All bits set with first-grade African bortz unless otherwise specified. Bulletin 44-A gives complete information.

SPRAGUE & HENWOOD, Inc. Dept. MM Scranton 2, Penna.

See our four-page insert in the Mining Catalogs

Africa *(Continued)*

under certain restrictions. There is now no limit on the quantity or conditions of sale, except that most market observers agree that it would be quite possible to flood premium markets with gold and bring the price down to the official level of $35 an oz. Some restraint in turning gold onto free markets will no doubt be used.

★**Geologists are looking around** South Africa for sources of titanium. One of the first turned up was in the beach sands of Natal, South Africa's main seaside resort. These sands were found to carry a heavy mineral content of anywhere from 5 to 90%, with ilmenite making up around 75% of the heavy mineral content. However, most of the good areas are tied up with beach resorts and other ownership problems. The best source thus far seems to be in the titaniferous iron ores of the Bushveld complex of the Transvaal. These ores, amounting to around 2-billion tons, carry from 8 to 25% TiO_2. It may be possible to use these ores through operation of a Krupp-Renn plant to be set up in the Eastern Transvaal.

★**All further new gold mines** in the Orange Free State will probably be equipped with twin circular shafts, as a result of experience to date in the field. It appears that the bulk of the field suffers from severe block faulting, resulting in need for "district" mining, for which twin shafts are most suitable. In addition, twin shafts permit sending more men underground, under the Union's safety rules, enabling development and mining to get started faster.

★**The ECA has granted** a credit of 330-million francs to the Moroccan firm of Bou Azzer et Graara to develop cobalt and asbestos deposits. Payment will be in minerals.

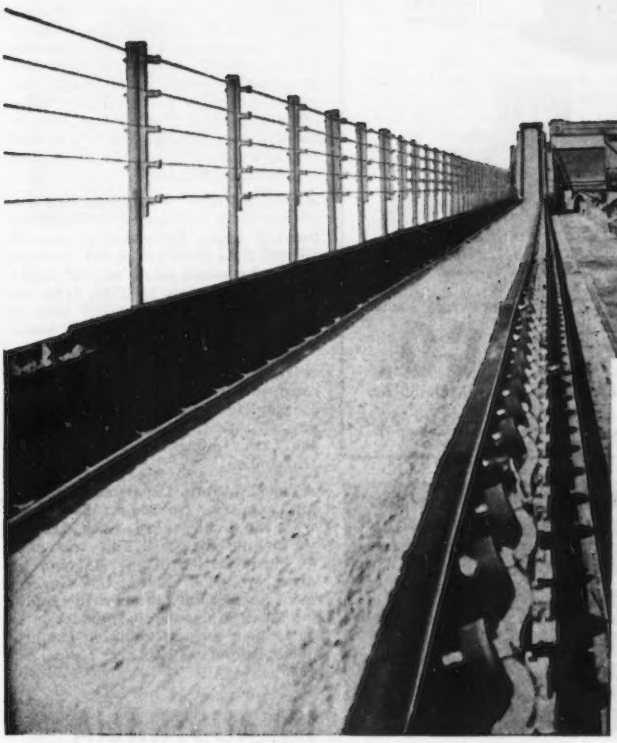
★**Copper orebodies,** first located soon after establishment of Cape Colony by gold seekers, are to be developed if their quality warrants it. Random sampling of propectors' dumps at the workings in Namaqualand gave assays of 14.88 and 17.88% copper.

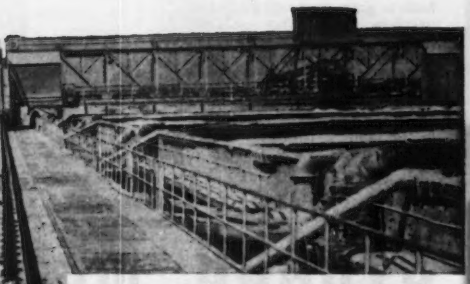
IN ASIA

★**Goa will export** 150,000 tons of iron ore to Japan in the three-year period beginning with September under a contract being negotiated between the Chowgli Co. of Goa and the Japan Steel Pipe Mining Co. The company wants a Japan Export Bank loan of 380-million yen to rehabilitate the mines.

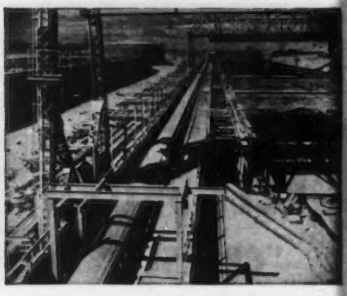
★**Thailand** produced 5,406 tons of tin ore in the first five months of 1951, a slightly higher rate than in 1950, when total output for the year came to 10,363 tons. Prewar annual average output was 16,000 tons. Exports

U. S. Rubber conveyor belt establishes a world's record





This record-breaking "U.S." belt carries a maximum of 5,000 tons of copper ore per hour, travels 600 f.p.m. through a traveling tripper. Total belt length is 2990 feet, width is 60", 42-ounce duck construction.



Twelve years' exposure to blistering tropical sun, one of rubber's worst enemies, has had little or no effect on the belt. It is located at the plant of the Chile Exploration Co., an Anaconda Copper subsidiary.

This U. S. Rubber conveyor belt in operation at a Chilean copper mine has carried over *100,000,000 tons* of abrasive copper ore . . . a world's record . . . at the amazingly low cost of less than *45¢ per 1,000 tons!* The belt has been in continuous service for over 12 years. The operators say there are still many more years of service in the belt, despite this record-breaking performance.

Such success as this results from 3-way engineering teamwork; mine operators, designers of conveyor equipment, and the United States Rubber Company belt engineers. For *your* haulage problem, large or small, call in a "U.S." engineer. Write to address below.

PRODUCT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

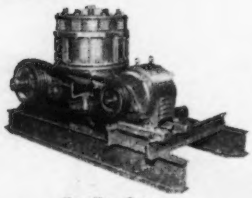
FOR LOWEST COST CRUSHING
Kue-Ken Jaw & Gyratory Crushers

The exclusive principle of "crushing without rubbing" gives users 5 to 10 times longer jaw plate life. A few of the other features include all mechanism sealed in oil bath. Lubricate twice a year. Automatic overload safety device without shearing or breaking parts. High capacity with low power requirements.

BALL MILLS RIB-CONE

Over 100 sizes and types of Rib-cone ball mills to choose from. For amalgamation and concentration of free milling ores, use a Rib-cone screening mill. Delivers a finished product direct to amalgamation plates. No classifier is needed. Rib-cone mills are also built in grate discharge and plain overflow types. Also available in sectionalized construction for muleback transportation. Over 40 years leadership in sectionalized construction provides correctly designed equipment that is easily transported and erected in the field. A complete line of mining machinery including tables, crushers, feeders, screens, classifiers, etc.

#42" x 27" Kue-Ken Jaw Crusher Capacity . . . 250-350 Tons per hour. Only 60 H.P. Required



Kue-Ken Gyracone

WRITE FOR CATALOG, PIDANOS CATALOGO ESPANOL

BALL MILLS #303 • JAW CRUSHERS #605 • GYRATORY #604R

STRAUB MFG. CO.

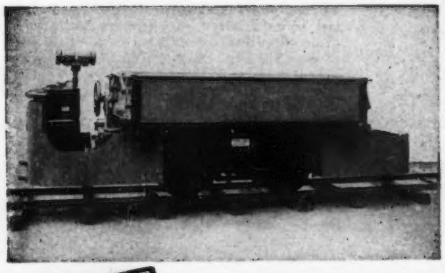
515 CHESTNUT STREET OAKLAND 20, CALIF., U. S. A.

Pennsylvania Crusher Co., Exclusive Licensed Eastern Manufacturer and Distributor Broad and Arch Streets, Philadelphia, Pennsylvania.
Sir W. G. Armstrong Whitworth & Co. (Ironfounders) Ltd., Authorized Licensed Manufacturer and Distributor Close Works, Gateshead-upon-Tyne, England.

Backed by 25 Years Experience with Storage Battery Locomotives

THE GREENSBURG "CRUISER"

Operators say — "20% MORE EFFICIENT than average Storage Battery Locomotives"



All Locomotives CUSTOM-BUILT to your requirements

FEATURES

2-motor drive; total 24 h.p.

Series parallel controller.

Extra long journal springs for better trackability, roadability.

Oil-tight, leakproof transmission. Use auto oil, renew once every 6 months.

Adjustable Timken Roller Bearings throughout.

Strong, Simple construction. Low maintenance cost.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

GREENSBURG MACHINE CO.

Makers of Custom Built Storage Battery Locomotives

102 STANTON ST., GREENSBURG, PA.

Asia *(Continued)*

went to Malaya (3,810 tons) and the U. S. (1,312 tons). Outbreak of the Korean War has greatly increased the demand for tungsten ore. Prices are up, reaching a record high at one time this year of 6,500 ticals per picul (about $2.60 per lb.) of wolfram concentrate. Output does not increase, however, owing to equipment and tranportation difficulties. Production this year is expected to come to about 1,300 tons.

★**India** may become a first-rank producer of sulphur if means are found to work successfully the pyrite deposits found recently in the southern hill areas of Bombay State. Early reports say one range of hills is "nothing but pyrite." Plans are on foot to use the ore to satisfy India's annual requirement of 50,000 tons of sulphur before exporting any.

★**New deposits of ilmenite** are reported from Ratnagiri in southern Bombay State. Estimated to contain 250,000 tons of 50% ore, the deposits are to be mined at a rate of about 5,000 tons monthly by 1952. India already exports about 200,000 tons of ilmenite ores and concentrates annually, most of it from Travancore.

★**The Indian Government** is studying construction of a zinc smelter for the country. It is also conducting a survey of the zinc resources available at the Zawar mines in Rajasthan, Central India.

★**The U.S. State Department** is sending a mission to see at first hand what the problems are of the **Malayan tin mining industry.** This was done at the invitation of the Malayan tin producers, who feel that U.S. Government agencies are in error in supposing that Malayan tin production is being held back by anything but production problems and high costs.

IN AUSTRALIA

★One of the **biggest tin-bearing deposits** in Australia may be shortly exploited on a large scale. Renison Associated Tin expects the introduction of large capital to develop its leases. This follows a thorough examination of the company's mines and fields by a leading Australian geologist. In the last financial year the company treated 8,840 tons of ore for a recovery of 77.5 tons of tin concentrates.

★**Montana Silver Lead N.L.** is issuing 23,375 forfeited shares to shareholders in the proportion of one for every five held. Proceeds will be used to electrify the existing plant and provide for a flotation section, additional equipment and for diamond drilling. First section of the milling plant is almost ready to start operations and the full plant is expected to be working by the end of 1951 or beginning

Have you seen anything like this?

35 tons of ash per day for 10 years passed over this CAST BASALT tile, taken from an ash race, and it's only worn down $\frac{1}{4}$"!

That's typical of CAST BASALT's abrasion-resisting qualities. It's hardness on the Mohs Scale is 8-9 compared to the diamond's 10. In addition it is impervious to concentrated acids.

CAST BASALT, a product of selected volcanic rock, furnace-melted and specially treated, is cast in standard shapes, flat and curved or made to special requirements.

CAST BASALT is used for all types of linings particularly in the mining and engineering industries. Time and time again it proves its worth.

Below: 79,500 tons of coke have already passed over this chute at a British steel works.

Get to know more about

CAST BASALT

by writing to

H. WINDSOR & CO LTD.
748 FULHAM ROAD LONDON SW6 ENGLAND
CABLES: BOILERSETTO HAIGREEN, LONDON

of 1952. Capacity of the mill was about 6,000 tons on one shift and proved reserves about 30,000 tons. Underground developments planned were expected to keep pace with ore extraction to maintain a supply of ore well ahead of the mill.

★**Argus Hill Chewton Gold** proposes to sink a winze from 455 ft. to test the cap of the formation. This was done on the recommendation of an expert who saw "distinct possibilities" in the mine.

★A syndicate formed recently to take an option on **S. & M. Tungsten and Tin** mine has decided to increase capital to purchase the mine. This mine promises to become one of the big producers of tungsten, tin and bismuth. On a weekly production of 1,200 tons of ore at 1.5% tungsten, tin, and bismuth concentrates, gross value would be about £1.35-million a year. Working costs and overhead would be much less than half this amount. Particulars of this property have been submitted to interested U.S. parties, who are prepared to enter into a long-term contract and to provide financial assistance if their requirements are satisfied.

★In future, lead from **Mt. Isa Mines** will be treated at the company's own refinery in England. Through absorption of Mining Trusts, Ltd., Mt. Isa would own its own lead refinery in London. The refinery would also handle substantial amounts of scrap. During August, 1951, Mount Isa treated slightly more ore than in July, but lead output dropped from 3,510 tons to 2,835 tons. There was an increase in zinc concentrates from 4,046 tons in July to 4,369 tons in August.

IN LATIN AMERICA

MEXICO

★**Mexican exports of silver** during the first five months of this year amounted to 118,400,000 pesos (that is, about $14-million), and if continued at this rate, would give Mexico one of its highest annual silver export rates on record. The Mexican Technical Institute said the country is still the world's largest producer of silver, but warned that a number of mines have been forced to close by rising costs.

★**Steel production** in Mexico is being paced by expansions at Altos Hornos foundries at Monclova, in northern Coahuila and the Fundidora iron and steel mills in Monterrey, Mexico. Fundidora has announced a $6-million expansion through stock sales.

★Expansion of the **Altos Hornos** plants has been financed by a $5-million credit granted by the Export-Import Bank. Recent discoveries of iron ore in the state of Oaxaca and along the Pacific coast area of Mexico

For Churn or Cable Drilling of
• BLAST HOLES
• PROSPECT HOLES
• SAMPLING
SAFE • EFFICIENT • ECONOMICAL

Spang Churn or Cable Tools are top performers in their fields for drilling test holes when prospecting or sampling . . . drilling blast holes for fragmentation of minerals or overburden . . . drilling and reaming escape, dewatering and ventilating holes . . . and drilling wells for other purposes. Fifty years' experience serving oil, water-well, mining and quarrying operations assures their value.

LARGE BITS for pilot hole drilling and stage enlargement reaming of dewatering, ventilation and escape holes.

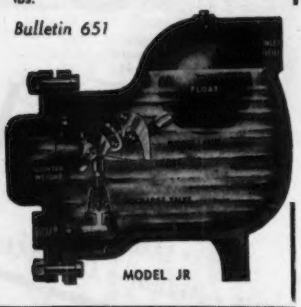
SPANG CABLE TOOLS
made by
SPANG & CO., BUTLER, PA.
for
• SHOT BLAST HOLES • WELL DRILLING
• PROSPECT DRILLING • SAMPLING

New NICHOLSON
NON-PLUG Air Traps

Have New Feature Preventing Build-Up of Sludge

New Nicholson oil-eliminating device solves the common problem of oil congealing and impeding or stopping trap's mechanism. Postive intermittent action. 3 types; press. to 1500 lbs.

Bulletin 651



MODEL JR

W. H. NICHOLSON & CO.
TRAPS · VALVES · FLOATS
201 Oregon St., Wilkes-Barre, Pa.

WANT TO KNOW WHAT MAKES IT TICK?
see page 26 & 27

R. G. LeTourneau, Inc.

Mexico *(Continued)*

have promised that the steel and iron industry in Mexico will continue to develop, according to authorities.

★**Latest iron ore discovery** in Mexico announced Sept. 9, was a spot known as "El Cubero," in the state of Michoacan, which is reported to have 67% ore with a reserve estimated at approximately 15-million tons by first surveys. The new deposit reported earlier is called Las Truchas.

CHILE

★**The Paipote smelter,** fired in about the end of October, has completed agreements with various producers for a supply of copper concentrates running about 4,500 metric tons a month. Designed in cooperation with Allis-Chalmers, the new smelter is owned and operated by the Chilean Government.

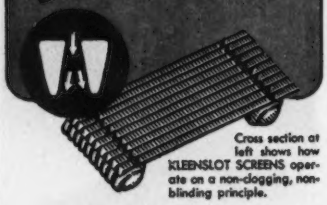
★**Cia. Minera Punitaqui** is increasing the tonnage of ore from the Tamaya mine. At present 7,000 tons per month are trucked from the mine to the Punitaqui mill for flotation treatment. The chief bottleneck to mining more ore is the problem of haulage to the mill.

IN THE PHILIPPINES

★Official figures released by **Benguet Consolidated Mining Co.** and its subsidiary **Balatoc Mining Co.** for the first six months of 1951 show a substantial improvement over the same period of 1950. Tons milled in the first half of this year were 431,442 compared with 321,605 tons in 1950, an increase of 34%. The daily milling rate was 2,384 tons, up from 1,777 tons in 1950. Total gold recovered in the six-month period was 95,389 oz., an increase of 25,580 oz. Average gold content per ton was 0.221 oz., slightly better than the 0.217 oz. in 1950. Operating cost per ton milled, including mine products taxed, but before reserves for depletion and depreciation and excluding income tax, was $7.40, or $33.50 per oz. recovered.

★**In the six-month period of 1951,** Benguet received an average price of about $58 per oz. for its bullion. During the first quarter of the year Benguet received a very high price for its gold, considerably exceeding the price in the corresponding period of 1950. The price declined in the second quarter, then recovered to 120 pesos an oz. in September. Profit per share after all charges and taxes was 9.3¢ for the first half of 1951, against 2.1¢ per share in 1950. A profit of $406,956 from the chrome contract at Masinloc contributed substantially to the company's good showing in 1951.

BY ANY *standard!*



Cross section at left shows how KLEENSLOT SCREENS operate on a non-clogging, non-blinding principle.

Kleenslot
WEDGE-WIRE PREPARATION SCREENS

are the last word in efficiency of operation. Long life, precision workmanship and low cost make these screens the definite leader in the field.

In spite of the tremendous demand for Wedge Wire Kleenslot screens our plant is still able to fulfill orders promptly.

Wedge-Wire CORPORATION
5602 CLARK AVENUE
CLEVELAND 2, OHIO

SEND FOR OUR ILLUSTRATED CATALOG

★**Samar Mining Co.** has taken over the iron deposit at Pili on Marinduque island, formerly controlled by the Gold Star Mining Co. At least 200,000 tons are in sight on the surface as huge boulders of hematite. Engineers have made favorable reports on new iron prospects on southern Mindoro. Prospecting has disclosed a hematite orebody carrying 61% iron with low silica and phosphorus. This area has heretofore had a bad name because of malaria but the danger appears exaggerated. Iron ore is in demand and production is increasing from all shippers.

★Shipments of chrome ore from **the Masinloc deposit** in June, July, and August totaled 77,915 tons, an average of nearly 26,000 tons per month. All shipments went to Philadelphia and Baltimore to manufacturers of refractory brick. The contract price for the ore has been increased to $13 a ton. An agreement has been made with Washington to ship a substantial tonnage to the stockpile over the next year.

★For the first eight months of 1951, **Mindanao Mother Lode** milled 80,500 tons and realized $2,312,680, or $28.70 per ton. Development work on the 1,000, 1,100, 1,200 and 1,300 levels at No. 2 shaft and the Hargis shaft is proceeding on schedule, and is going ahead fast enough to keep sufficient ore exposed for full mill tonnage.

Now You Can SEE Where You Can't LOOK

On "Utiliscope" receiver, operator "sees" distant or dangerous operation in comfort and safety.

This is an "Exploratory" Advertisement

Frankly, we don't know what uses there are for the "Utiliscope" (Wired Television) in the mining industry . . . so in the adjacent ad we are simply telling you what it will do. Based on our experience in other fields, we suspect there are many places in the mining industry where the "Utiliscope" will improve product quality, save manpower, prevent accidents or help increase production.

If you want to look into the possibilities of the "Utiliscope", simply write us for a copy of Bulletin 1025H which explains the equipment and shows various applications. Please address your request to Department "H".

Diamond Power Specialty Corporation
Department "H"
Lancaster, Ohio

WITH THE DIAMOND "UTILISCOPE"

(WIRED TELEVISION)

In industry, research, commerce, science, etc., many operations and conditions that need to be seen cannot be looked at because it is too difficult or too dangerous.

The "Utiliscope" (wired television) enables you to see where you can't look. Its camera eye can be placed in dangerous, remote or inaccessible spots and it will bring an exact image right to the operator. Moreover, several cameras can observe various parts of an operation or several related operations. Images of these directly in front of the operator enable him to accurately control the whole . . . concentrating responsibility and avoiding mistakes through erroneous information.

The "Utiliscope" saves manpower, improves product quality, increases production and prevents accidents.

The Diamond "Utiliscope" is surprisingly simple and low in cost. No special skill is needed for installation and operation. Its stability and reliability are exceptional. Ask for Bulletin 1025 which shows a wide variety of cost-cutting applications.

TYPICAL USES—Studying destructive tests of engines • Watching flow of molten steel • Checking remote gauge readings • Observing conditions inside furnaces • Viewing nuclear research • Coordinating materials flow on conveyors.

The "Utiliscope" (Reg. U.S. Pat. Office)

4593

DIAMOND POWER SPECIALTY CORP.
FIRST IN INDUSTRIAL TELEVISION
LANCASTER, OHIO • OFFICES IN 39 PRINCIPAL CITIES
Diamond Specialty Limited — Windsor, Ontario
Since 1903, Diamond has Manufactured Quality Equipment For Industry

WRITE FOR BULLETIN 1025

SERVICE HOURS

...*not Footage*

The True Yardstick of Air Hose Value

When buying air hose, your thinking should not be in terms of footage-per-dollar but rather in terms of service hours.

Experience tells you that the hose which is built with an *extra* measure of strength, flexibility, damage resistance and safety is surely your soundest investment.

This is true of *every* BWH Air Hose. Each has been specifically developed, tested and field-proven to give maximum long, trouble-free life in its job.

Get in touch with your BWH distributor — *today*.

BWH

DEPENDABLE RUGGEDNESS

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS.
P.O. BOX 1071, BOSTON 3, MASS., U.S.A.
Warehouse Stock, 111 N. Canal St., Chicago, Ill.

CONCORD AIR — An extra quality, exceptionally rugged hose for toughest use on air drill and pneumatic service in mines, quarries and construction jobs. Non-porous tube resists heat and oil. High tensile cotton yarn braid reinforced carcass. Tough grey cover resists cutting, gouging, abrasion. 7 sizes from ½" 2-braid through 2" 3-braid. 200 to 300 lbs. working pressure. Maximum length 50'.

BAY STATE AIR DRILL — For heavy construction work in mines, quarries, tunnels and wherever large size hose is required for long service. Smooth black tube resists heat and oil. Carcass of strong, rubber-impregnated multiple ply woven duck. Rugged, heavy-gauge red rubber cover resists severe weather extremes, cutting, abrasion. 9 sizes stocked from ½" to 4". Working pressures from 150 to 225 lbs. Max. length 50'.

AUROCHS AIR — For portable air compressors, jackhammers, rugged industrial and construction work. Smooth, black, non-porous tube resists heat and oil. Carcass: multiple ply, rubber-impregnated, rugged woven fabric. Tough black cover resists weather and abrasion. Stocked sizes: ½", ¾", 1". 200 lbs. working pressure. Maximum length 50'.

VIM AIR — For general industrial use, on compressors and pneumatic tools. Black tube resists oil and heat. Husky cotton yarn braids. Smooth, red cover resists weather, abrasion. 8 sizes stocked, ¼" 2-braid to 1" 3-braid. Working pressures: 150 to 225 lbs. Maximum length 500'.

BULL DOG VARI-PURPOSE AIR — For a variety of jobs including handling of air, water, oil, gasoline, kerosene (not for paints, lacquers, lacquer-solvents). Black, synthetic tube resists oil and heat. Carcass is braided rayon cord, high strength, super flexible. Smooth, brown, tough synthetic cover resists oil, abrasion, sunlight. 11 sizes stocked from 3/16" one-braid to 1" 2-braid. Working pressures: 200 to 300 lbs. Maximum length approximately 500'.

WHICH JUMBO MEETS YOUR NEEDS?

ROGERS

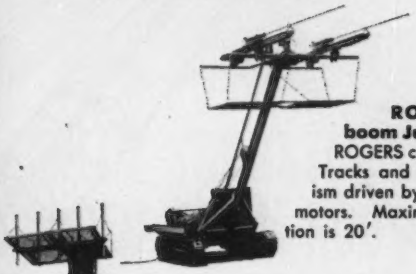
Customized

JUMBOS

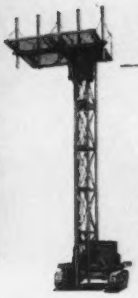
for

DRILLING
POWDER-LOADING
SCALING
ROOF BOLTING
TIMBERING

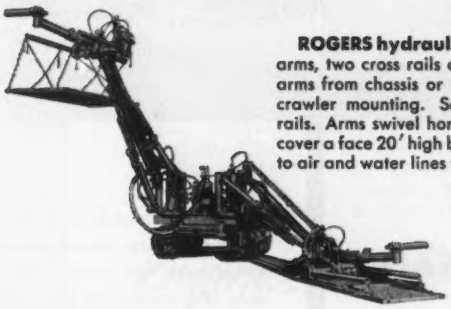
ROGERS combination vertical mast and hydraulic jib arm Jumbo. Mounted on electric motor driven crawler chassis. Two jib arms with platforms and cross rails may be raised and swiveled to cover full 18′ wide from ground level to 24′ elevation. Mast folds to pass through 12′ entryway. Safety dogs prevent platform from dropping accidentally.



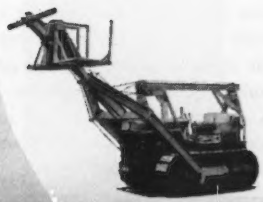
ROGERS pivoted boom Jumbo. Mounted on ROGERS crawler type chassis. Tracks and elevating mechanism driven by individual electric motors. Maximum boom elevation is 20′.



ROGERS vertical fixed mast Jumbo. Mounted on ROGERS crawler. Single platform has safety dogs to prevent accidental dropping. Platform raises to 30′.



ROGERS hydraulic jib arm Jumbo with two extendable arms, two cross rails and dual controls for operation of jib arms from chassis or from operator's platform. Rogers crawler mounting. Self-leveling platforms and cross rails. Arms swivel horizontally and raise vertically to cover a face 20′ high by 16′ wide. Single connections to air and water lines for Jumbo and both drills.



ROGERS pivoted boom Jumbo. Mounted on customer's tractor. Cross rail and platform for two drills. Maximum elevation of cross rail, 18′.

For additional information and catalog, write:

ROGERS
[illegible] WORKS COMPANY
[illegible], Mississippi

BUCYRUS-ERIE EXTRA VALUES MEAN

Dependable High Output

Big, dependable yardages are "standard equipment" for Bucyrus-Erie excavators, as owners and operators the world over will testify. The superior performance records of Bucyrus-Erie result from fast, smooth operating cycles and on-the-job reliability for peak output every shift . . . *plus* the extra values of soundly engineered design and durable construction available only to Bucyrus-Erie as a result of its unmatched experience in the construction of quality excavating machinery.

142L51

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

UP TO 25 TIMES MORE FOOTAGE PER REGRIND

Hayes

RIPLOY TUNGSTEN CARBIDE TIPPED DRILL RODS . . . .

There are big savings to be made with this tungsten carbide rod when drilling in hard ground. Compared with steel bits you can get up to 25 times more footage. Hayes will also retip these rods when required, giving added economy, especially with the longer sizes of rods. Hayes makes in Canada every type of drill bits—tungsten carbide, PM detachable or dovetail. For more information, complete and mail the coupon below.

HAYES STEEL PRODUCTS LIMITED, Merritton, Ont., Canada

Representatives: GENERAL SALES & EQUIPMENT LIMITED, Winnipeg, Manitoba; HAYES STEEL PRODUCTS LIMITED, Red Lake, Ontario; CONSTRUCTION EQUIPMENT CO. LTD., Montreal, Quebec, and Halifax, N. S.; GEORGE MacLEOD, Noranda, Quebec; HEAP & PARTNERS (NFLD.) LTD., St. John's Newfoundland; THOMAS M. NEVIN Y CIA S. A., Mexico, D.F.; WESTERN MACHINERY COMPANY, Spokane, Washington; Denver, Colorado, San Francisco, California; G. T. JOHNSON, 4340 West 8th Avenue, Vancouver, B. C.

Engineered first--- to last...

HAYES STEEL PRODUCTS LIMITED, Merritton, Ont., Canada

Please send me full information on your Tungsten Carbide rods.

NAME.....

COMPANY.....

ADDRESS.....

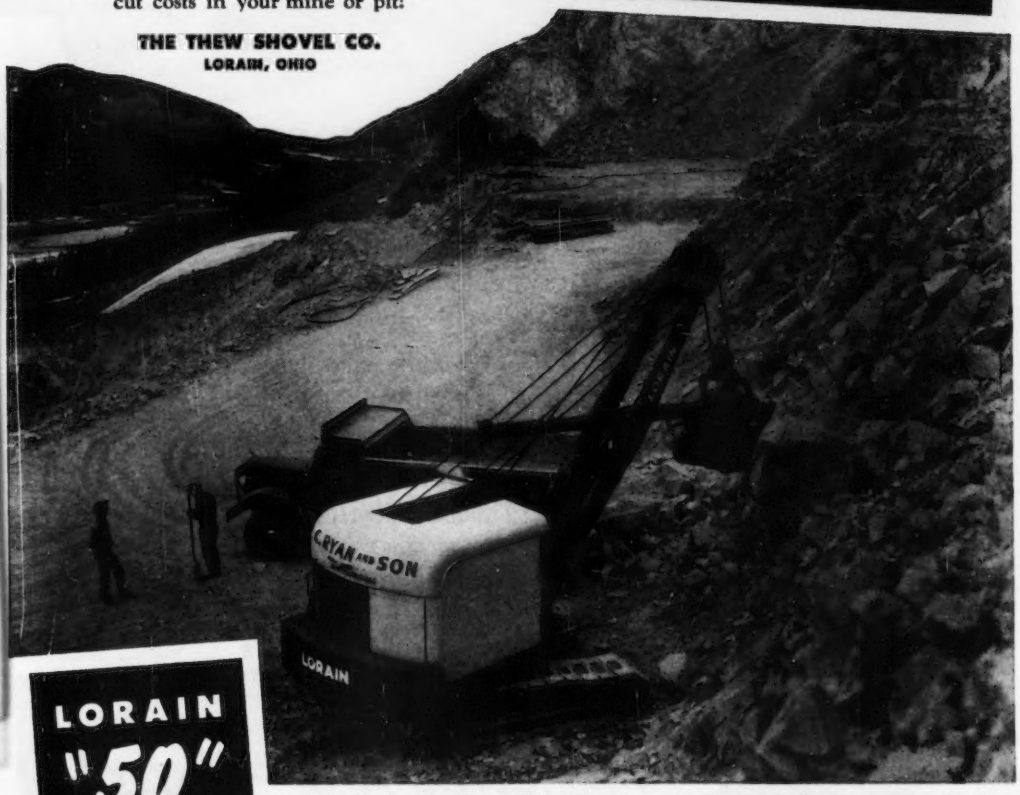
World's Largest Molybdenum Mine

is the striking setting for this new Lorain 50-I shovel. This Climax, Colorado pit produces 90% of the world's supply of molybdenum, so vital in today's production of steels.

Tough rock digging — and lots of it — is a specialty of this 1-yard Lorain-50 because it is equipped with a shock-absorbing, hydraulic (fluid) coupling that offers many advantages for easy operation, increased production and longer life. It is the only 1-yd. shovel available with this feature as standard equipment! The Lorain-50 story is worth checking with your Thew-Lorain Distributor — to boost production and cut costs in your mine or pit!

LORAIN "50" WITH HYDRAULIC COUPLING LICKS ROUGH-TOUGH DIGGING at Climax, Colorado Pit

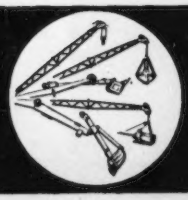
THE THEW SHOVEL CO.
LORAIN, OHIO



LORAIN "50" FEATURES

- *Hydraulic Coupling Power Take-Off* — digging power "hangs on"— cushions shocks
- *Air Controls for Steering and Tread Lock* — from operator's cab in any swing position
- *One-Piece Cast Steel Turntable Bed* — extra strength; revolves on anti-friction bearings
- *Choice of 6 Mountings* — 3 crawler lengths in 2 widths; also on rubber-tires

THEW **LORAIN**®
on CRAWLER or RUBBER



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

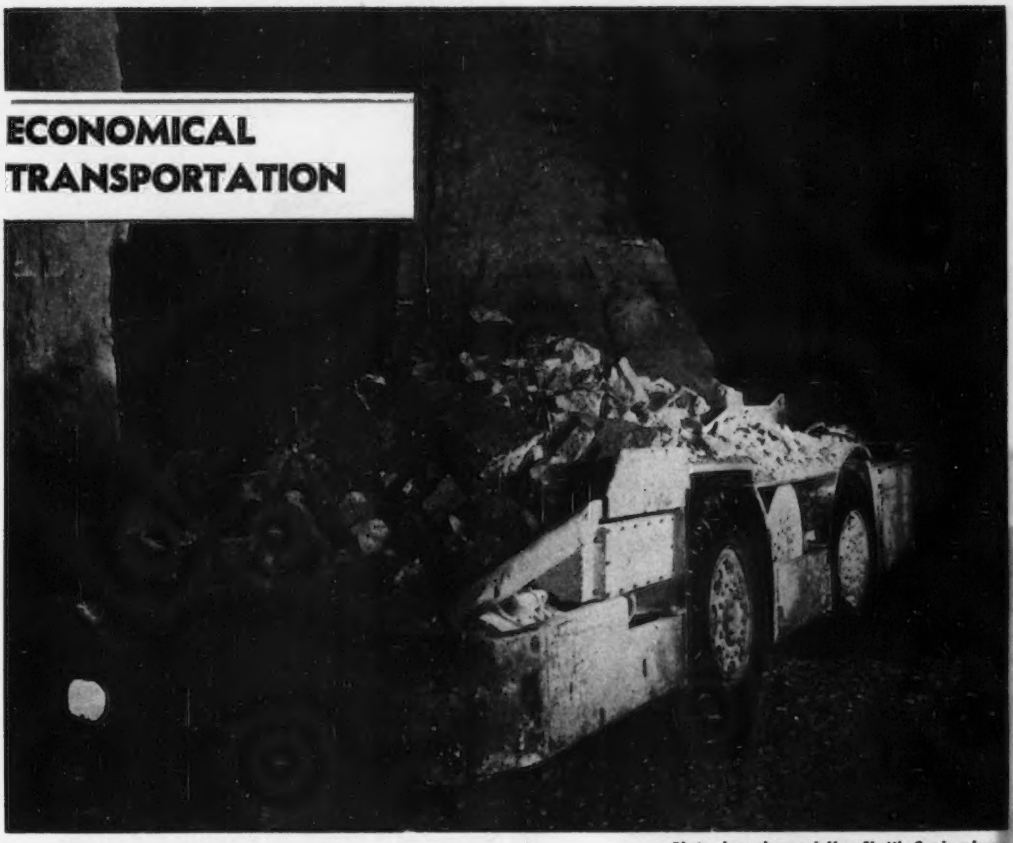


Photo above shows a Jeffrey Shuttle Car in a large lead mine. Note carrying capacity.

FOR THE METAL MINE

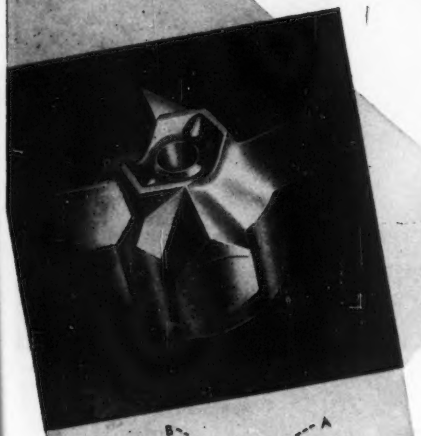
Consider the Jeffrey Shuttle Car for high production and low cost per ton in transporting material when and where you want it most. These improved cars have many features: rigid design; airplane disc-type, 4-wheel hydraulic brakes; hydraulically-driven variable speed Conveyor; hydraulic booster steering; etc. We'll be glad to go into more detail.

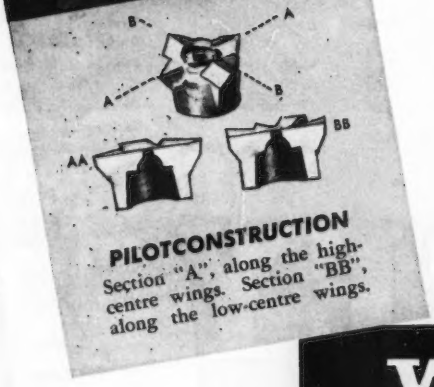
Products:	
	Crushers
	Bucket Elevators
Locomotives	Fans and Blowers
Drills	Conveyors
Trammers	Grizzlies
Feeders	Screens
Magnetic Separators	Car Pullers
Chains	Pulverizers

THE JEFFREY MANUFACTURING COMPANY
ESTABLISHED 1877
Complete Line of Material Handling, Processing and Mining Equipment

ORDERED...TESTED...

APPROVED!





PILOTCONSTRUCTION
Section "A", along the high-centre wings. Section "BB", along the low-centre wings.

Your stamp of approval of the fast drilling Liddicoat detachable rock bit made it necessary to expand the plant facilities of Western Rock Bit Manufacturing Co. The enlarged factory means continued efficiency and service to an ever-expanding list of the world's largest mining and contracting firms.

Here in the center of the West's mining and contracting activities, an exclusive, patented process produces Liddicoat bits for distribution in the 11 western states, Alaska and the Philippines.

The combination of streamlined automatic mass-production methods, steel made to exacting specifications, plus the use of specially designed machinery makes possible outstanding Liddicoat performance.

Tocco high-frequency induction generators permit even temperatures in heating the steel. Forgings are extruded in heavy, high-speed forging presses designed specifically for the Liddicoat bit. Bits are forged to exact tolerance with no hand operations, to assure uniform quality.

Special equipment, special steel, special techniques add up to this — fast-drilling Liddicoat detachable rock bits that need no resharpening, because they are used to destruction, provide fast cutting performance and low initial cost, resulting in lowest cost per foot of hole drilled.

Test Liddicoat and you will buy the finest.

EVERY LITTLE BIT COUNTS

WESTERN
Rock Bit Manufacturing Company
552 West 7th South • Salt Lake City 4, Utah

WHAT WOULD **YOU** SPECIFY . . .

Fluid	Concentration	Temp	Type of Valve	Valve Material
1 Sulphuric Acid	20%	120 F.		
2 Sulphuric Acid	100%	180 F.		
3 Hydrochloric Acid	22%	80 F.		
4 Hydrofluoric Acid	50%	125 F.		
5 Beer		200 F.		
6 Oxygen		Ambient		

In several of these cases other body materials or diaphragms would serve as well. But the really important fact is the unmatched versatility of Grinnell-Saunders Diaphragm Valves in handling corrosive fluids, gases, compressed air, food and suspended solids . . . in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are problems.

Grinnell-Saunders Valve bodies are stocked in cast iron, malleable iron, stainless steel, bronze, and aluminum, with other materials available on special order. Valve bodies can be lined with lead, glass, natural rubber or neoprene. Diaphragms are available of natural rubber and a number of synthetics to suit particular service conditions.

The Grinnell-Saunders Valve Division will be pleased to submit recommendations upon receipt of complete information covering service conditions.

We supplied Grinnell-Saunders Diaphragm Valves with . . .

Body Material	Diaphragm Material
1 Rubber lined	Natural rubber
2 Cast iron	KEL-F
3 Glass lined	Butyl
4 Magnesium	KEL-F
5 Polished bronze	White diaphragm
6 Cast iron*	Neoprene

*For oxygen service a high flash point lubricant is supplied. All valves for oxygen service are subjected to 300 lb. air underwater test

Features of the Grinnell-Saunders Diaphragm Valve

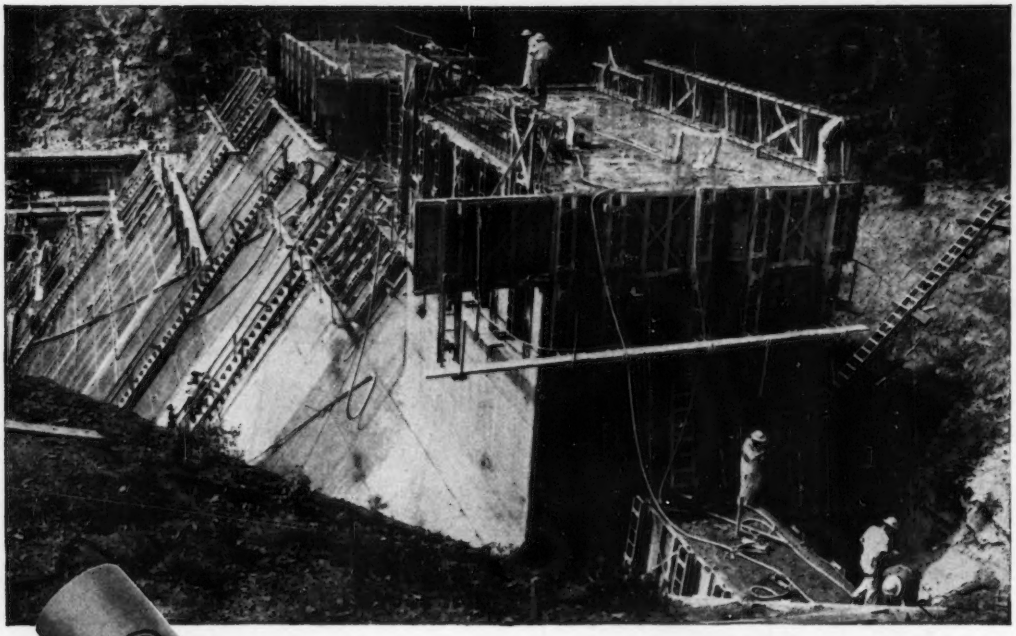
- diaphragm absolutely isolates working parts from fluid
- diaphragm lifts high for streamlined flow in either direction
- diaphragm presses tight for positive closure
- body, lining and diaphragm materials to suit service
- simple maintenance—diaphragm easily replaced

GRINNELL

WHENEVER PIPING IS INVOLVED

Grinnell Company Inc., Providence, Rhode Island • Sales Offices and Warehouses in Principal Cities

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco humidification and cooling systems



Philpott Dam finds solution to difficult Water and Air Hose problems

● Air and water hose, used in the Philpott Dam construction, came up against every enemy in the book. Changeable Virginia weather weakened hose resistance to high pressure loads, abrasive concrete structures clawed away hose covers, and the rocky terrain made deep, stabbing, carcass-penetrating wounds that caused sudden breakdown and work stoppage.

Ordinary hose wouldn't meet these challenges. Engineers, faced with rigid work schedules, couldn't put up with interruptions. They called in the local Republic Rubber Distributor, who, after a thorough study of all hose hazards, recommended use of Republic's Champion Air Hose and Republic's Champion Water Hose.

9,000 feet of these standard-built (not custom-made) pressure carriers went into immediate action for Philpott engineers who say Republic hose eliminated work stoppages and cut maintenance costs to absolute minimum.

Republic Rubber Products produce results like this for men in every industry. There's a complete line of Hose, Belting, Packing and Molded & Extruded Products. Just drop us a card regarding any one of these products.

CHAMPION AIR DRILL HOSE

A super service hose of braided construction on oil-resistant tube, a strong flexible carcass and shock-resisting cover.

CHAMPION WATER HOSE

Top quality hose of wrapped construction, built with specially reinforced carcass, a smooth, friction-reducing tube and a rugged outer cover that provides maximum protection against external damages.

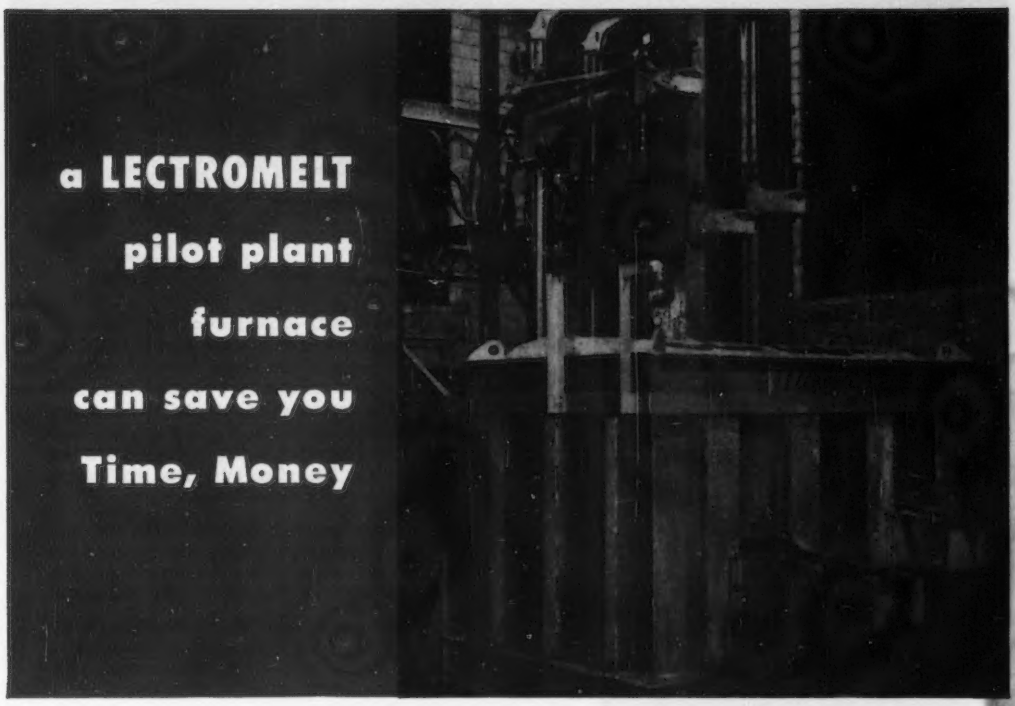
INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

between laboratory batch and production run . . .



Ores and concentrates to be treated vary considerably. Before trying to design a production setup based on theory and small-scale lab tests alone, prove the process with a Lectromelt Pilot Plant Furnace.

Lectromelt engineers can help you with that pilot operation, calling on their wealth of electric furnace know-how. The furnace they recommend will be versatile—substation equipment will provide a wide range of secondary voltages; varying electrode spacing and refractory conditions can be provided for. Conditions resulting from the hot and cold sensitivity of practically any material can be met, enabling you to make test runs on a wide variety of changes.

After you prove your process, Lectromelt engineers will then work with you to design your production unit. Lectromelt field engineers' services are customarily provided when a Lectromelt furnace is purchased.

Write for your free copy of our catalog, "Moore Rapid Lectromelt Furnaces for Smelting and Refining Operations." Pittsburgh Lectromelt Furnace Corporation, 322 32nd Street, Pittsburgh 30, Pa.

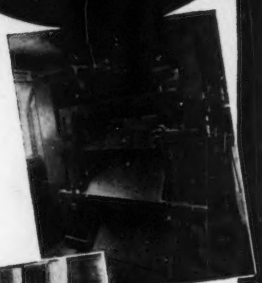
Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . SWEDEN: Birlec, Elektrougnar A/B, Stockholm . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

WHEN YOU MELT... MOORE RAPID *Lectromelt*

DINGS magnetic equipment for every mining requirement!

Dings Rectangular Electromagnet provides maximum iron removal above belts or chutes. Triple pole design for great magnetic strength and depth of penetration. Maximum magnetic strength across entire magnet face. Easily installed in any position. Low operating cost . . . trouble free . . . complete range of sizes.



(Right) Induced Roll Separator purifying sand.

Battery of Crockett Separators concentrating magnetite. (Left)

Magnetic Detector signals presence of tramp iron. (Right)

NEW, powerful Cross Belt Separator — with higher selectivity—for concentration and purification (Above)

NEW, powerful, non-electric Alnico Perma-Pulley for purifying, cobbing, protecting crushers, pulverizers, etc. Magnetic permanence guaranteed for life of installation. (Above)

Wherever crushers must be protected against tramp iron, wherever magnetic separation can contribute to the beneficiation of ores, you will find Dings magnetic separators specially designed to meet the requirements of the job. Dings magnetic separators have played an important role in making the extraction of many minerals possible and economically feasible. Shown here are a few of the machines which Dings has pioneered exclusively for the mining industry for the following purposes:

CONCENTRATION—everything from specially designed pulleys for cobbing nickel ores to powerful induced roll and cross belt separators for concentrating manganese, tungsten, chrome, titanium and many other minerals.

PURIFICATION—removing small amounts of feebly magnetic impurities with super high intensity separators. Minerals treated include feldspar, silica sand, salt, bauxite, barytes, nepheline-synenite, gypsum.

CRUSHER PROTECTION—magnetic pulleys, pulley type separators, drums, suspension magnets, spout magnets and magnetic detectors are all widely applied for arresting tramp iron ahead of crushing equipment.

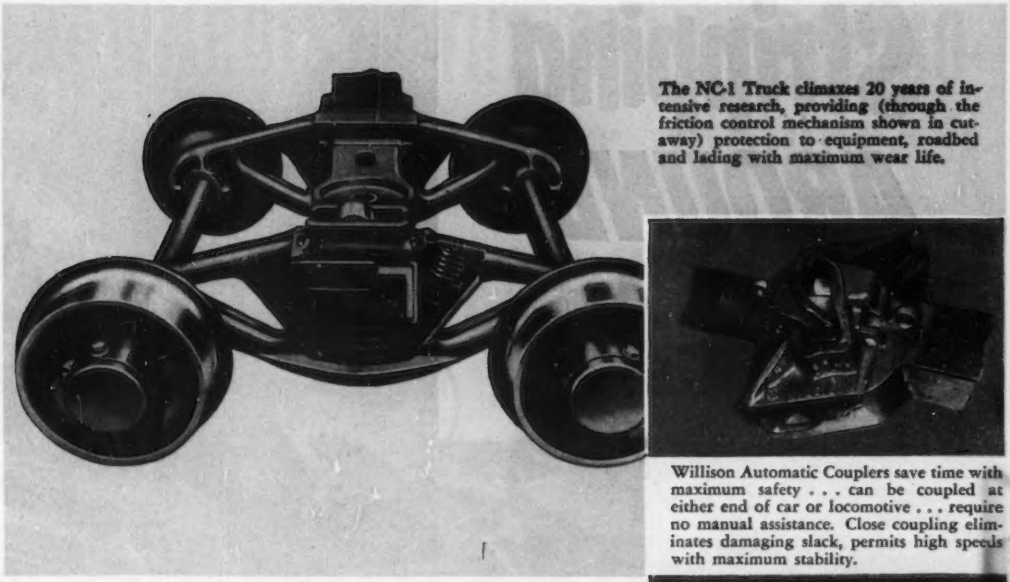
WET TYPE SEPARATORS—Dings has pioneered in the development of wet type separators for concentrating magnetite and for use in new processes for concentrating low grade ores. *Ask for complete details of Dings Separators for Heavy Media Process Plants.*

Take advantage of Dings equipment and experience. For practical recommendations, submit your requirements with 25 lb. samples of material to the Dings Laboratory for testing and analysis. Literature on request.

DINGS MAGNETIC SEPARATOR CO.
4716 W. ELECTRIC AVENUE, MILWAUKEE 14, WISCONSIN

"Magnetic Separation Headquarters Since 1899"

Dings
"HIGH INTENSITY"



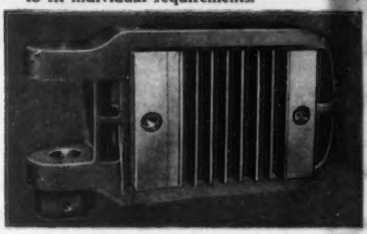
The NC-1 Truck climaxes 20 years of intensive research, providing (through the friction control mechanism shown in cutaway) protection to equipment, roadbed and lading with maximum wear life.

Willison Automatic Couplers save time with maximum safety . . . can be coupled at either end of car or locomotive . . . require no manual assistance. Close coupling eliminates damaging slack, permits high speeds with maximum stability.

NATIONAL *products cut per ton costs!*

Latest example of National's pioneering in better equipment is the NC-1 Truck. Its sweeping advancements over conventional trucks include long soft springs, a friction mechanism—controlling vertical and transverse oscillations, a cast one-piece bolster with large lubricated center connection, and automatic frame alignment. The NC-1 has been designed with the same factor of safety that is required by the Association of American Railroads for full size railroad trucks, and embodies the same features which A.A.R. tests have shown to be essential to produce good riding qualities. For the best in profitable equipment, *always specify National products.*

National M-230 Rubber-Cushioned Draft Gear for cars operating through rotary dump. Soft initial-action, high-capacity rubber pads provide maximum impact protection, lengthen equipment life. Available in a range of capacities and design variations to fit individual requirements.



M-225 Rubber-Cushioned Draft Gear for locomotives and large capacity cars not required to operate through rotary dump. Maximum protection in minimum space.

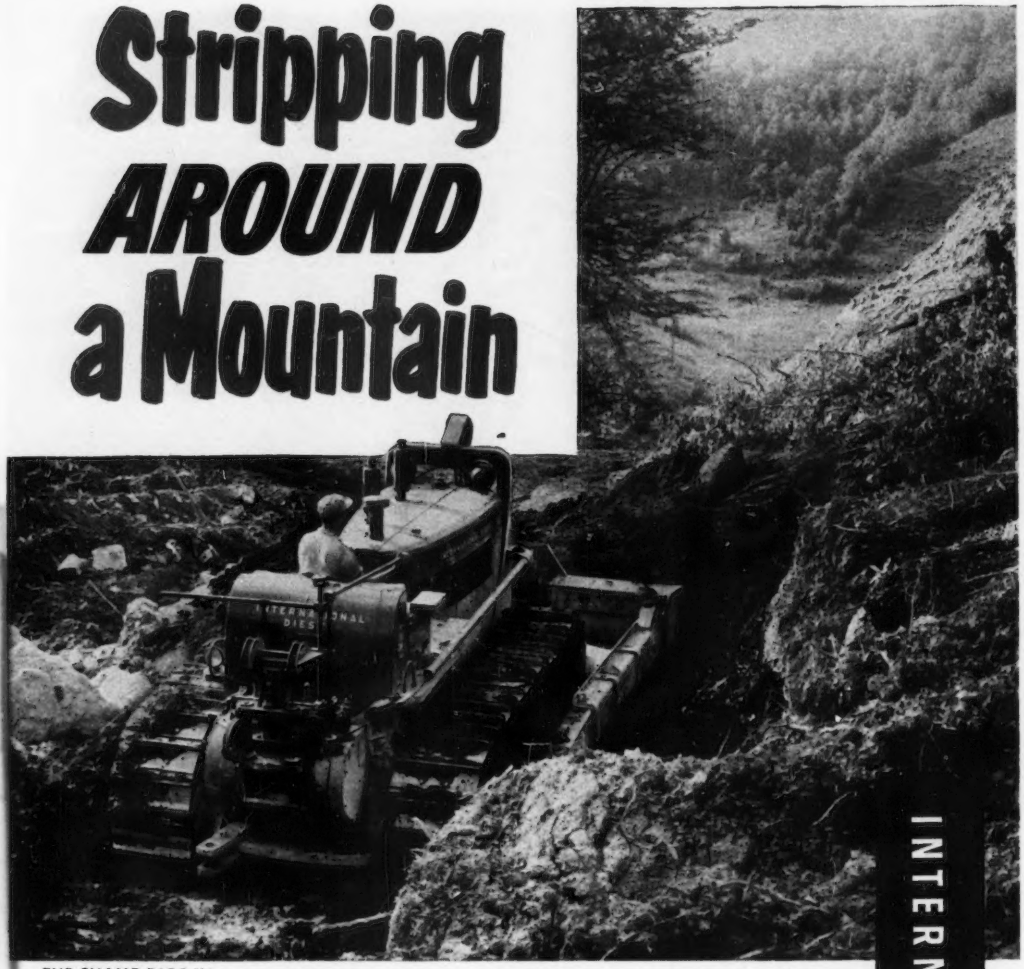
A-3865

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NC-1 TRUCKS • DRAFT GEARS • NACO STEEL WHEELS

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY M&S Co. Est. 1868

Stripping AROUND a Mountain



THE CHAMP DIGS IN on the Meade Fork operation, where Dick Construction Company is strip mining for the Clinchfield Coal Corp. International's exclusive Planet Power Steering means pivot turns, feathered turns, turns with power on both tracks. 8 speeds forward, 8 reverse, with a shift up or down one speed without declutching.

How West Virginia mine operators strip the coal with International's "Big Red" TD-24

Down in the rough mountain country of Virginia and West Virginia, there's high-grade coal aplenty in seams up to ten feet thick. And the Dick Construction Company uses five International TD-24s to get at it.

They start stripping on a mountainside where a seam outcrops, and work around and around the mountain till they've stripped off the overburden to a depth of 50 to 60 feet. It's rough, tough, demanding work, where the TD-24 is the Champ for sure.

One reason is the TD-24's maximum of 148 drawbar horsepower, more than any other crawler. The TD-24 can take huge bites of dirt and rock. It moves them faster, too, and backs up faster to get in position for another load. It does more work in less time. It moves more paydirt per day.

For the whole low-down on the TD-24, ask your friends who own them. Ask your International Industrial Distributor, too, and ask him about his well-equipped field service, always at your call. Find out all the answers. You'll be a TD-24 man from then on in!

INTERNATIONAL

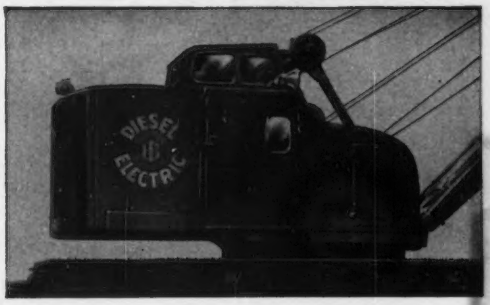
INTERNATIONAL HARVESTER

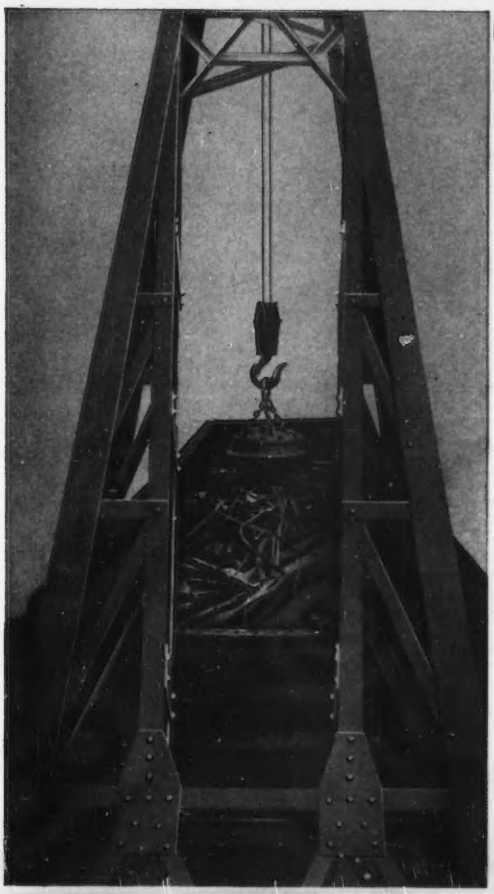
POWER THAT PAYS

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

BROWNHOIST – THE ONLY LOCOMOTIVE-CRANE CAB THAT PROVIDES A CLEAR VIEW IN EVERY DIRECTION

Approximate visibility from ordinary cab. *Approximate visibility with operator on side.* *360 degree visibility from new Industrial Brownhoist Monitor-Type Cab.*





Mounted high in the crane and surrounded by large windows, the operator in a Brownhoist patented Monitor-Type cab has full 360° visibility – forward, backward, and to both sides – providing safer operation, faster, more efficient loading and unloading. In addition the new Clear-Vision Boom is another Brownhoist feature that permits the operator an unobstructed view of his work. When unloading from high-walled railroad cars he can see right into the car.

The Monitor-Type cab is also designed for the safety and comfort of the operator. All controls are conveniently located and can be easily reached from a comfortable, well-raised seat. There's a soundproof partition between the operator and the machinery. There are doors on both sides of the cab and there's a 14" safety clearance between car body and rotating upperworks.

Brownhoist Diesel and Diesel Electric Locomotive-Cranes are available in capacities from 20 tons up for speeding materials handling with magnet, hook or bucket. Write today for complete information.

BROWNHOIST BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN

DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago, Canadian Brownhoist Ltd., Montreal, Quebec. **AGENCIES:** Detroit, Birmingham, Houston, Los Angeles. 148

Your choice of COLOR

IN HARD BOILED* Safety Hats

STRONGER-THAN-STEEL FIBERGLAS crowns offer unlimited choice of vivid, permanent colors... with color molded all the way thru the safest crowns ever built. Shock-resisting ribbed design also available in aircraft grade aluminum.

Write for Full Color Circular

SAVE MONEY... save time! One size fits all heads . . . reduces inventories. Fully adjustable headband and hammock; can be changed in *six seconds*. Self-shaping and air-cushioned for comfort.

EVERYTHING BULLARD IN SAFETY · HARD BOILED · *T. M. Reg.

Distributors in principal cities

E. D. BULLARD COMPANY

275 EIGHTH STREET, SAN FRANCISCO, CALIFORNIA

Here's Why it Pays You to Read the Advertising

The advertising is a rich source of valuable information. In this magazine it offers you ideas and products that may well apply advantageously to your business.

Every issue is a catalog of goods, materials, and services — quickly available to you—just for the reading.

Leaders in business and industry turn to the advertising because they've discovered it helps them run their businesses more profitably.

When you read all the ads in this magazine, the chances are good that you'll get a lead that will materially help you do a better job. For example, you may find a specific piece of equipment that will be a profitable time-saver. Or a tool that will increase worker efficiency. That's why it pays to read the advertising. It's good business.

HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

REACH FOR A LUFKIN RED END RULE

Here's the folding wood rule that America's busiest engineers use in their daily work.

The Lufkin Red End 066D, marked in feet, 10ths, and 100ths of feet is tough, springy, built to take plenty of hard use. Jet black markings on white background stay easy-to-read.

Look for and ask for Lufkin—the only folding engineers' wood rule with the bright red ends.

066D

BUY LUFKIN

TAPES • RULES • PRECISION TOOLS

THE LUFKIN RULE CO.
SAGINAW, MICHIGAN
132-138 Lafayette St., New York City
Barrie, Ont.

149

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT
This is the Coppus VENTAIR. A centrifugal blower, it is designed for long pipe lines, high pressures.
This is the Coppus VANO. The propeller-type, best for shorter pipe lines, medium pressures.

These are the cost-reducing Blowers that give up to 100% more air

Only Coppus makes both types — and both are made especially for *mine* ventilation. One or the other, operating under the conditions for which it is designed, delivers from 30% to 100% more air for a given power consumption than an ordinary all-purpose fan.

They can be used as blowers or exhausters and are driven either by compressed air or electric motor, with capacities up to 90,000 CFM. Like all Coppus products, these blowers wear the "Blue Ribbon" that stands for high achievement in engineering, workmanship and performance.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corp., Worcester 2, Mass.

COPPUS ENGINEERING CORPORATION
291 Park Avenue, Worcester 2, Mass.

Please send.....Bulletin 130

Name .....

Company .....

Address .....

Only Carlon

THE FIRST REAL PIPE THAT IS PLASTIC!

TO SOLVE MAINTENANCE AND REPLACEMENT PROBLEMS in any type of mine, specify CARLON plastic pipe. Guaranteed against rot, rust and electrolytic corrosion, it has a trouble-free service life many times longer than ordinary pipe. CARLON is completely resistant to the chemical action of sulphurous waters, alkalies, metallic salts, and other corrosive wastes.

CARLON is lightweight and can be handled easily—no heavy materials handling equipment or special tools needed. Its smooth internal surface will not accumulate scale and minimizes frictional loss.

Flexible CARLON is produced in all standard pipe sizes. It is supplied in long lengths which require fewer fittings per installation and conform to irregular surface contours as well as slope or entry direction.

A complete line of molded plastic fittings incorporating standard I.P.T. is available for plastic-to-plastic or plastic-to-metal connections.

To obtain the most durable mine pipe produced today, specify CARLON.

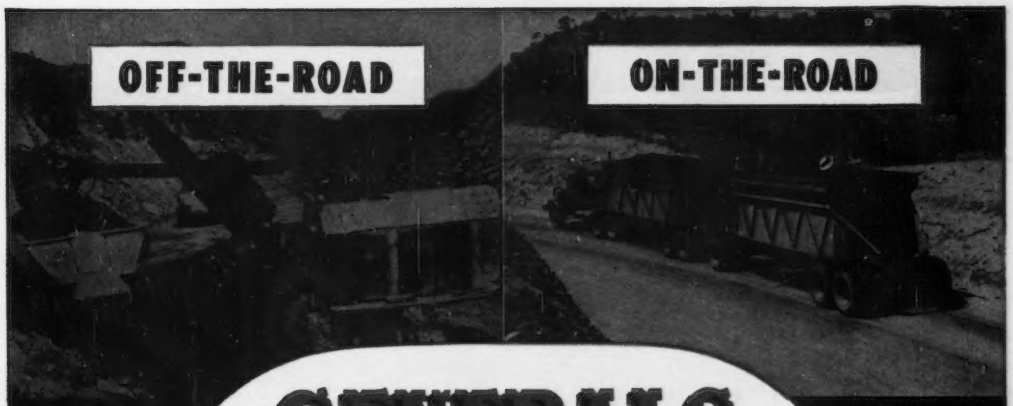
268-CP

At present, raw material shortages are limiting the production of certain types of CARLON pipe. Every effort is being made to overcome this problem and to meet the demand for CARLON . . . the first real pipe that is plastic.

CARLON CP

CARLON PRODUCTS CORPORATION

IN CANADA: MICRO PLASTICS, LTD., ACTON, ONT.
10220 MEECH AVE. • CLEVELAND 5, OHIO



GENERALS

Resist cuts, scrapes, bruises...
Give more traction! More speed!
More safety—

WORK FASTER... LAST LONGER... COST LESS

more profit for you per job!

GENERAL L.C.M. Broad, deep, self-cleaning tread lugs and reinforced shoulders for more traction off-the-road. Longer wear on razor sharp mine and quarry surfaces.

GENERAL H. C. T. for most work on-the-road, some off. More rubber, more cords per inch for greater safety. Extra traction through sand, gravel, slush, mud.

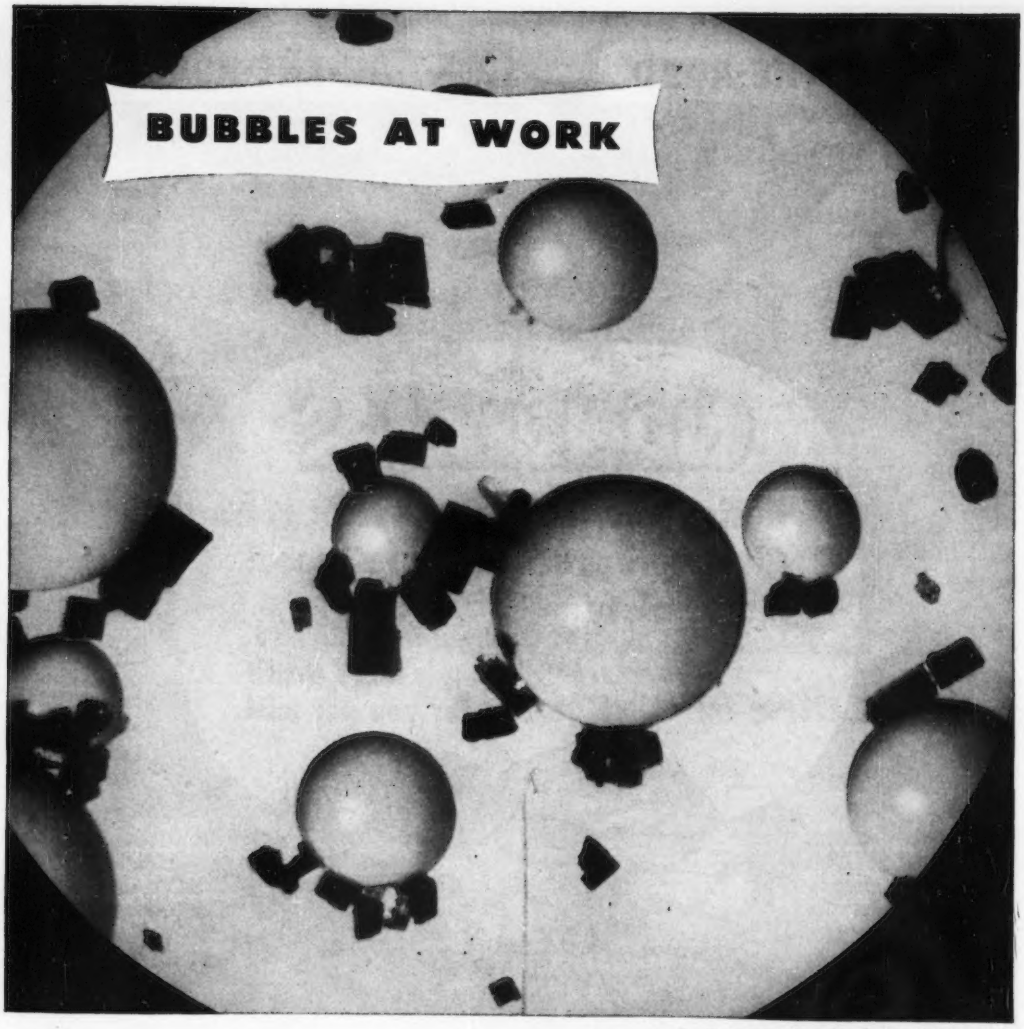
THE GENERAL L.C.M.

THE GENERAL H.C.T.

GENERAL UNDERGROUND MINING TIRE

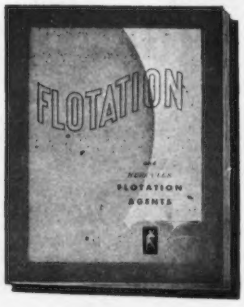
. Extra strong, extra thick rubber at the shoulders. Resists cuts, snags, bruises. More traction. More wear.

REQUEST GENERAL TIRES ON YOUR NEW EQUIPMENT



Photomicrograph, greatly enlarged, by H. Rush Spedden

To help step-up flotation recoveries at low cost, Hercules has developed a number of frothers and collectors. Yarmor® F Pine Oil has been a standard of quality among pine oil frothers since the early 1920's. RADA (Hercules' Rosin Amine D Acetate) is a siliceous mineral collector that has good solubility and is easy to handle. It is used in the commercial flotation of several nonmetallic ores. These and other Hercules products are described in a 16-page technical booklet, "Flotation and Hercules Flotation Agents." This booklet also contains many formulas useful in the operation and control of modern ore-dressing mills. *Send for your copy.*



HERCULES POWDER COMPANY 933 King St., Wilmington, Delaware

HERCULES Flotation Agents

NM51-1

"Let the shovel go . . . but hang on to that DIPPER"

When the preference for an Amsco Dipper is so strong that a superintendent at one of Minnesota's largest iron mines quietly removes it from a shovel being shipped to another mine, there are apt to be some good performance reasons why!

The superintendent reported that this AMSCO 6½ yard renewable lip dipper *loaded a record number of tons per 8 hour shift*—more than had ever been loaded before. And, where other dippers needed repairs every 2 months or so, it is still going strong after 6 months of service with no repairs of any kind!

Better design and construction are the reasons for this high production and longer, uninterrupted service. The wide mouth and shallow depth permit faster, easier digging and loading, and a 4-way taper insures clean dumping every time.

And, this dipper is *all-cast*—of tough, work-hardening AMSCO Manganese Steel. The renewable lip and heel plate, when finally worn, are replaceable in a matter of minutes.

Dippers can—and should be—bought with an eye to higher digging efficiency and lower costs per ton . . . and the moral of this actual on-the-job example is clear . . .

WHEREVER YOU MEET A PROBLEM OF WEAR CAUSED BY IMPACT AND/OR ABRASION . . .

. . . find out about longer-lasting, dollar-saving Manganese Steel Dippers made by AMSCO . . . world's largest producer of manganese steel castings for all industry.

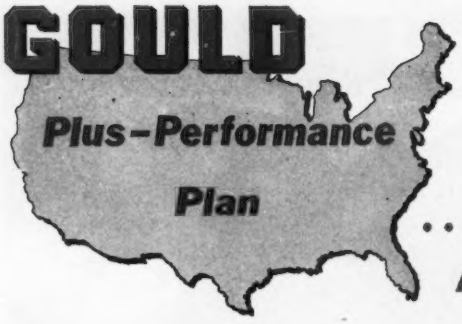
AMSCO controls impact and abrasive wear in 5 basic industrial operations:
Transportation
Crushing and Pulverizing
Materials Handling

Brake Shoe | **AMERICAN MANGANESE STEEL DIVISION**

376 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

GOULD



...SHOWS YOU HOW ACCURATE RECORDS

LENGTHEN BATTERY SERVICE!

Keeping of accurate records is vital to the conservation and extension of essential battery power. The GOULD PLUS-PERFORMANCE PLAN makes the keeping of battery records easy by providing you with full information on how to test your batteries, and charts and forms for recording test data.

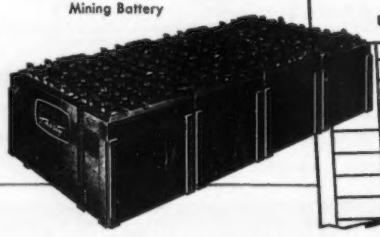
This timely plan puts at your disposal a complete system of manuals, articles, specifications, bulletins, charts, graphs and forms explaining and illustrating how to select, charge and handle, maintain and determine the condition of your batteries. This material, which can increase battery service as much as 50%, is FREE to battery users, without obligation. A request on your letterhead will bring descriptive booklet by return mail.

DAILY RECORD SYSTEM CONTROLS BATTERY MAINTENANCE

Number each battery and, as each is installed, read and record its specific gravity and temperature on chart illustrated below (these charts are FREE on request to users of the GOULD PLUS-PERFORMANCE PLAN). Record also, date each battery is put into service, and vehicle to which each is assigned. When each battery is charged, specific gravity, temperature, time, setting of ampere-hour meter and the date and amount of water are recorded.

Such a record tells 1) whether batteries are fully charged when placed in service; 2) number of hours each battery was in service; 3) if batteries were discharged below normal value; 4) whether batteries are being properly charged; 5) when batteries should be changed to prevent overworking and resultant failure during shift.

The GOULD "Thirty" with "Z" PLATES— America's Finest Mining Battery



BATTERY RECORD

Day Operator_____ Night Operator_____ Date_____

Charging										Put in Service			Returned			Remarks:
Started					Finished											
Date	Time	Amp.	Temp.	S. G.	Date	Time	Amp.	Temp.	S. G.	Date	Time	Truck No.	Date	Time	S. G.	

GOULD STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

Triple reasons for specifying...

TRIPLE ALLOY STEELS *containing* NICKEL

1 PERFORMANCE—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.

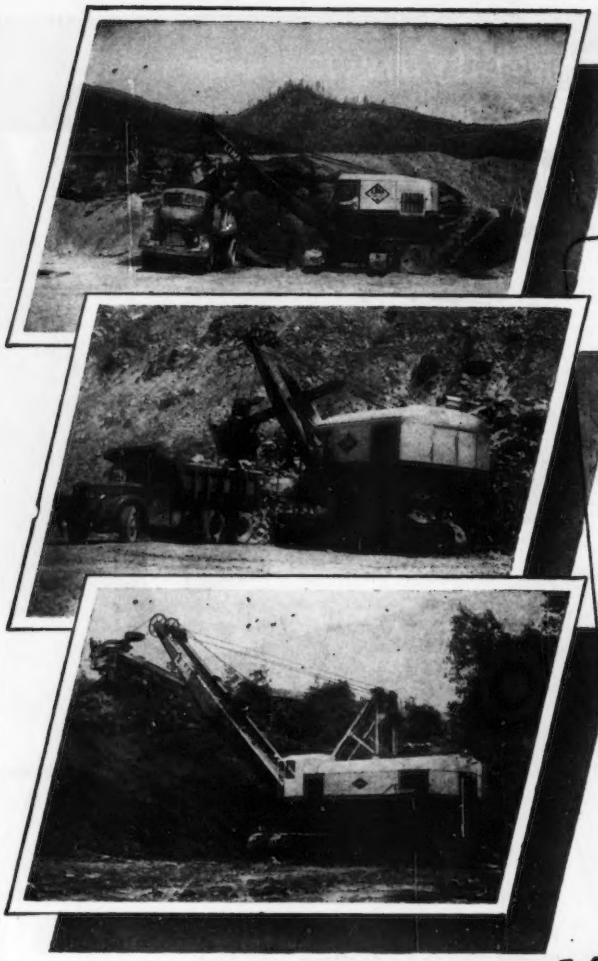
2 VERSATILITY — Ability to meet varied specification demands after suitable heat treatment.

3 ECONOMY—resulting from standard compositions precisely graded to match the engineers' needs.

Experience shows that triple-alloy steels containing Nickel are solving some mighty big problems in many industrial fields. They have established outstanding service records in some of the most exacting applications. The many standard compositions available make it possible to select *accurately*, and with economy, triple-alloy steels to fulfill the requirements of a great variety of applications.

We invite inquiries regarding the selection and uses of triple-alloy steels, containing Nickel.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N. Y.



LIMA

CAPACITIES
CRANES-Up to 110 TONS
SHOVELS-¾ Yds. to 6 Yds.
DRAGLINES-Variable

LIMA Rubber Mounted TRUCK CRANES in 20 and 35 Tons Capacity

LIMA rubber-mounted cranes offer you the added benefits of greater mobility, less travel time and better maneuverability. Rotating assemblies have the same basic features as corresponding crawler machines, with alterations adapting them to truck or wheel mounting. With outriggers supported, they provide extra capacity; are ideal for operations requiring constant movement around the job, for small scattered jobs, or remotely located.

FIRST BY COMPARISON

LIMA Shovels, Cranes and Draglines have always stood alone by comparison because they are engineered and built to give every user the best value for his investment. Their high productivity, versatility and money-saving features keep down-time to a minimum and output at a maximum.

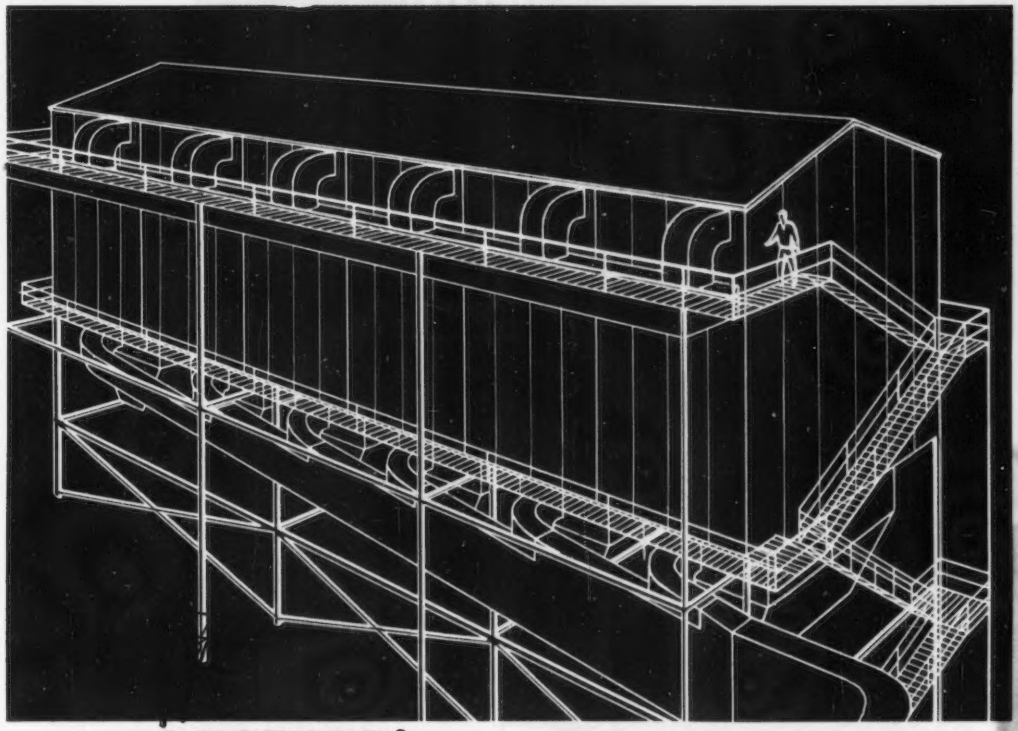
Investigate LIMA shovels, cranes and draglines. See for yourself how they help you get greater production at lower cost. *Baldwin-Lima-Hamilton Corporation, Lima-Hamilton Division, Lima, Ohio, U. S. A.*

BALDWIN · BLH · LIMA-HAMILTON

T2101

SALES AGENTS IN PRINCIPAL CITIES OF THE WORLD

BALDWIN-LIMA-HAMILTON



DUSTUBE® . . . custom designed for the mining and metallurgical industry

Dustube Collectors are individually designed for the rigorous dust and fume applications of the mining and metallurgical industry. They have the inherent capacity for continuous, severe service at high filtration efficiency, with a minimum of down time for maintenance. Uniform recoveries approaching 100% are commonplace. Hot and/or corrosive gases are efficiently handled through the use of synthetic filtration fabrics. Automatic units can be designed to permit interior inspection and maintenance of the Dustube without shutting down.

Dustubes can be custom designed to readily fit existing or new plant buildings, flue lines and ground contours. Various arrangements of hoppers and hopper discharge mechanisms are available—including steep-sloped pyramid hoppers with rotary, double-dribble or slide gate valves; trough type hoppers with screw conveyors; or flat-bottom hoppers with built-in scraper conveyors.

All collected fume or dust is automatically conveyed to one central point, thus eliminating expensive hand labor in handling valuable by-products. Collected materials may be reprocessed without dewatering, filtering or drying.

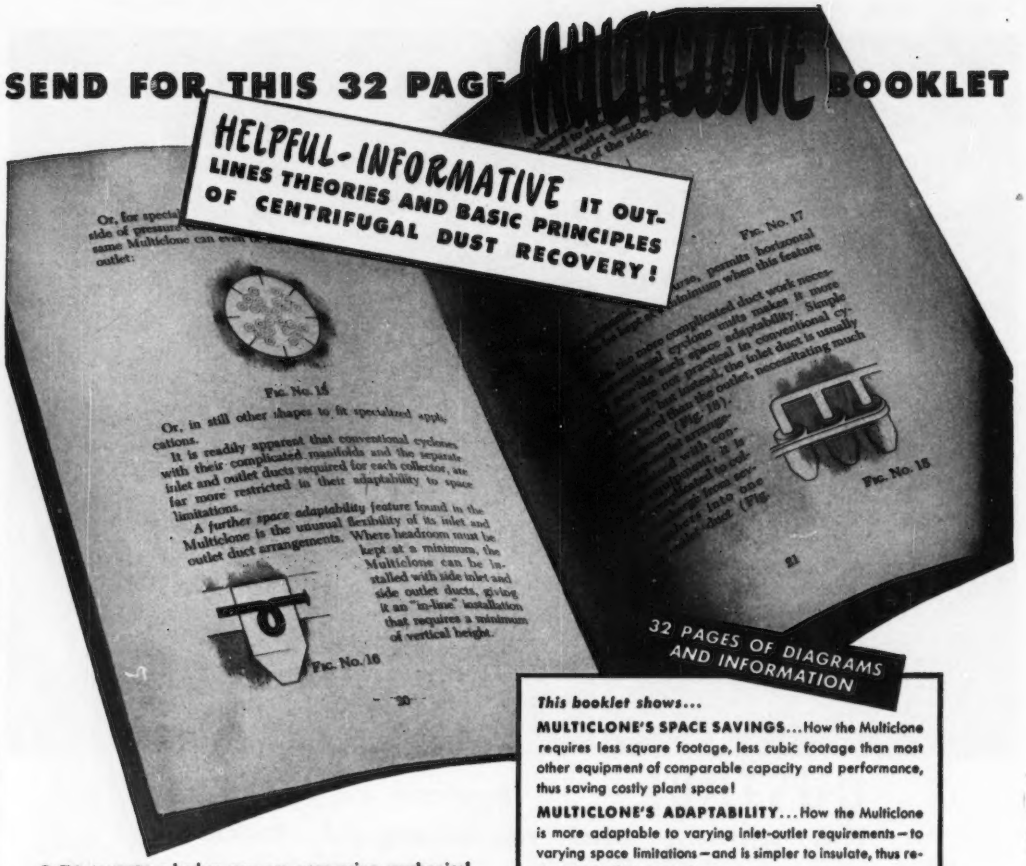
Our engineers are at your service to assist you in your filtration problems. It will pay you to investigate the many advantages of Dustube Collectors. *Write for complete information today.*

TYPICAL APPLICATIONS

Lead blast furnace gases
Zinc fuming retorts and sinter fumes
Electric melting furnace fumes
Reverberatory lead furnace fumes
Dwight-Lloyd sinter fumes
Filtration of furnace gases

dustube
COLLECTORS

SEND FOR THIS 32 PAGE MULTICLONE BOOKLET


HELPFUL-INFORMATIVE IT OUTLINES THEORIES AND BASIC PRINCIPLES OF CENTRIFUGAL DUST RECOVERY!
Fig. No. 15
Fig. No. 16
Fig. No. 17
Fig. No. 18
32 PAGES OF DIAGRAMS AND INFORMATION

NO MATTER whether you are now using mechanical dust recovery equipment or are planning the installation of such equipment at some future date, here is a booklet that is full of helpful and valuable information on centrifugal dust recovery. It not only explains the basic methods and principles involved, but also shows the important differences between small and large diameter separating tubes, shows how to simplify your duct work and reduce installation costs, and outlines many other important factors to be considered in selecting mechanical dust recovery equipment.

In addition, this informative booklet illustrates and explains how MULTICLONE'S unique *vane* design is fundamentally different...how it makes possible greater compactness, simpler installation, high recovery of the small particles as well as the medium and coarser ones, and many other facts on MULTICLONE advanced design.

A limited supply of these booklets is available for free distribution to those interested in mechanical recovery equipment and methods. Write for your copy today.

This booklet shows...

MULTICLONE'S SPACE SAVINGS...How the Multiclone requires less square footage, less cubic footage than most other equipment of comparable capacity and performance, thus saving costly plant space!

MULTICLONE'S ADAPTABILITY...How the Multiclone is more adaptable to varying inlet-outlet requirements—to varying space limitations—and is simpler to insulate, thus reducing installation costs!

MULTICLONE'S EFFICIENCY...How Multiclone's multiple *small diameter* tubes, made possible by its exclusive vane design, give higher centrifugal forces and more complete cleansing of *all* suspended particles—even small ones of 10 microns and less!

MULTICLONE'S LOW MAINTENANCE...How the Multiclone has no high speed moving parts to repair or replace, no pads or filters to clean or renew, nothing to choke gas flow or increase draft losses as suspended materials are recovered. Multiclone draft losses remain uniformly low—recovery efficiencies uniformly high—at all times!

Make sure that a copy of this helpful booklet is in your reference files by sending for your copy now!

NOW SELLING...

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U.S.A. and foreign countries.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 LaSALLE ST. BLDG., 1 N. La SALLE ST., CHICAGO 2 • HOBART BUILDING, SAN FRANCISCO 4, CALIFORNIA
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

When **PRODUCTION**

hangs by a "Thread"....

specify the wire rope that gives the greatest service. "HERCULES" (Red-Strand) *Preformed* spools more evenly —bends more smoothly. Handles more safely. Splices more easily. Far fewer replacements are needed.

Engineered to reduce internal tension and twisting, "HERCULES" (Red-Strand) *Preformed* stays *on* the job—*in* the groove.

For uninterrupted production, there is only one right rope... be sure to select the correct size and type.

LESCHEN WIRE ROPE

Feel free to consult our Engineering Department at any time for specific recommendations. A. LESCHEN & SONS ROPE CO., 5909 Kennerly Ave., St. Louis, Missouri. Warehouses and branch offices in all principal cities.

BALLMILLS

WET OR DRY GRINDING

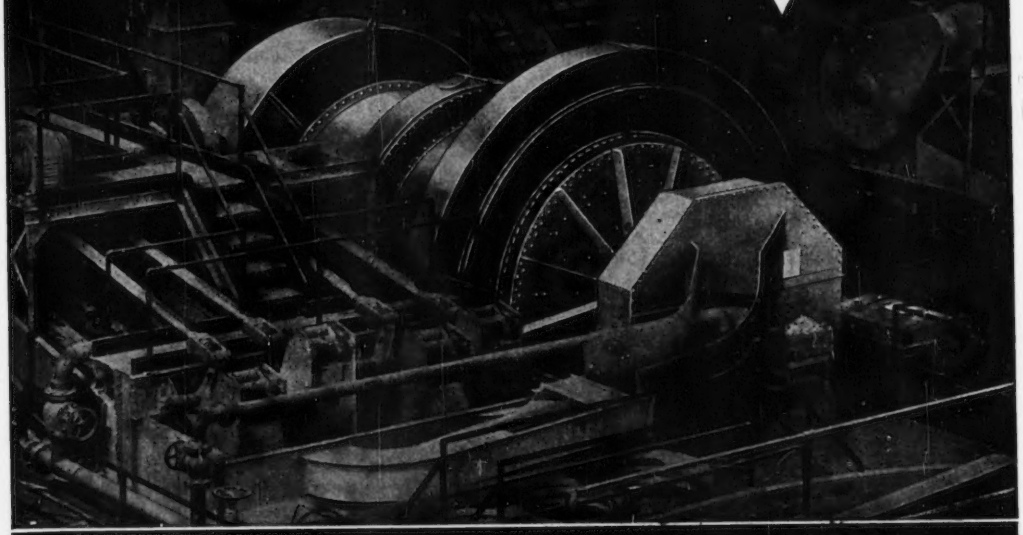
•

OPEN OR CLOSED CIRCUIT

•

ALSO AIR SWEPT FOR GRINDING AND DRYING

•



F. L. SMIDTH & CO.

11 WEST 42ND STREET

ENGINEERS
MANUFACTURERS OF BALLMILLS
SINCE 1895

NEW YORK, N. Y.

AKINS HMS SEPARATORS ARE SUPERIOR

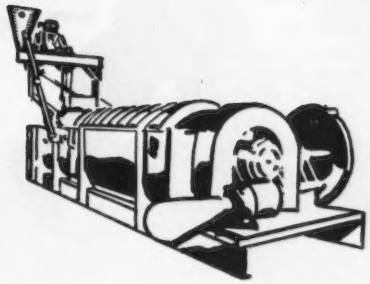
Competitive Field Tests Prove It

1945 AKINS vs. **Closed-Top Cone Separator** On Iron Ore

1946 AKINS vs. **Open-Top Cone Separator** On Lead-Zinc

1947 AKINS vs. **Open-Top Cone Separator** On Garnet Ore

1950 AKINS vs. **Drum Type Separator** On Iron Ore



We asked the operators to make these competitive tests. In each case, the tests showed the Akins to produce appreciably better recovery and grade of product. The Akins Separator can also improve **your** metallurgy and lower your costs because of proved installation and maintenance economies. **And** it is the only HMS separatory vessel in commercial operation capable of making a three-product separation.

Send for the verified results of competitive tests and informative literature on the AKINS.

Please send me all competitive test results mentioned above and your HMS Bulletin No. 49.

1860—NINETY YEARS' SERVICE TO MINING—1950

COLORADO IRON WORKS CO. CIW

REPRESENTATIVES

Canadian Locomotive Co., Ltd., Kingston, Ont., Can., Licensed Manufacturer—Head, Wrightson & Co., Ltd., Stockton on Tees, Eng., Licensed Manufacturer—John Carruthers & Co., (Pty.) Ltd., Sydney, Aus., Licensed Manufacturer—Head, Wrightson & Co., S. A., (Pty.) Ltd., Johannesburg, Licensed Manufacturer—Edw. J. Nell Co., Manila, P. I., Sales Agents—Wright Bros., Credit Foncier Bldg., Vancouver, British Columbia, Sales Agents.

COLORADO IRON WORKS COMPANY

1624 17TH STREET DENVER 2, COLORADO

Please send me without obligation your new Bulletin No. 49.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

Have you ever seen a flying 'dust' man?

...You will when a Buell Engineer shows you how to reclaim the values in escaping dust and attain top over-all efficiency

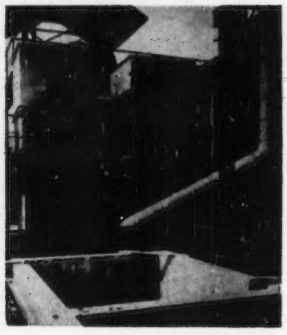
When we're called upon to boost efficiency and halt profit losses due to escaping dusts, Buell engineers plan with precision, yet move with surprising speed.

Quickly, they can pin-point a costly escape-dust problem...compute the actual loss in dollars as well as in efficiency... then, with a sureness that comes only by experience. they will design and build the dust recovery system that will most efficiently and economically do the job.

Here's why: Buell engineers—a highly skilled group of industrial "dust" men—are backed by more than 200 man-years of experience in the science of dust recovery. As a result, industry looks to Buell for leadership in methods and equipment that mean more recovered dust at less cost—for you!

For full information write today. Ask for the new, informative 'Dust Recovery' bulletin. Buell Engineering Company, Dept. 19-K, 70 Pine Street, New York 5, N. Y.

'SF' Electric Precipitator for collecting acid mist.



C. E. ROSENBERG A. D. P. S.

ELECTRIC CYCLONIC

HIGH-EFFICIENCY CYCLONES • ELECTRIC PRECIPITATORS
TYPE 'LR' COLLECTORS • LOW DRAFT LOSS COLLECTORS
SPECIAL PURPOSE COLLECTORS • DUST HOPPER VALVES

buell

ENGINEERED EFFICIENCY IN DUST RECOVERY

UNIFORMITY

Makes the Big Difference in FILTER Fabrics

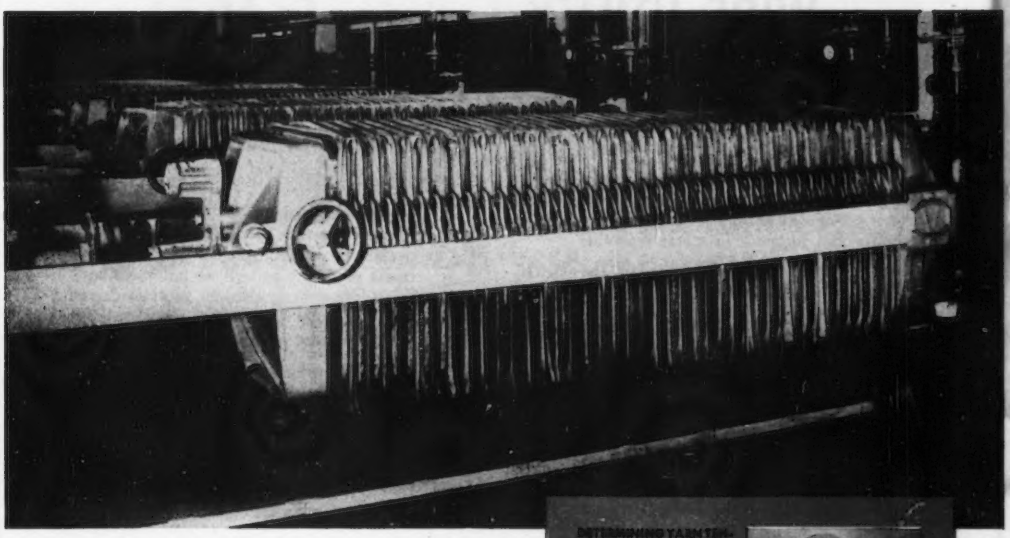
MT. VERNON EXTRA

Gives You Greater Fabric Uniformity

The greater uniformity of Mt. Vernon Extra means more efficient filtering — greater clarification of filtrates, more complete recovery of solids.

AT YOUR SERVICE

Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.



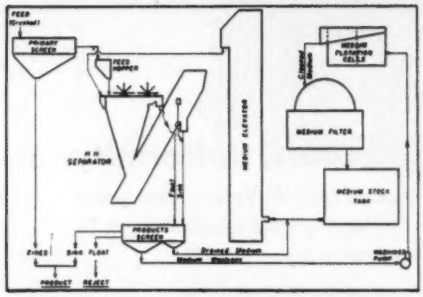
Mt. Vernon-Woodberry Mills

TURNER HALSEY COMPANY
Selling Agents
40 WORTH ST NEW YORK

Branch Offices: Chicago • Atlanta • Baltimore
Boston • Los Angeles • Akron

DETERMINING YARN TENSILE STRENGTH WITH 300-LB. VERTICAL TEST. One of a series of comprehensive laboratory controls throughout production to ensure uniformity in all Mt. Vernon-Woodberry products

H H SINK FLOAT Process



SAVINGS, INCREASED PRODUCTION and WIDE UTILITY . . *mark the*

H. H. SINK FLOAT PROCESS

Recent developments in this widely-used ore separation process, have resulted in increases in metal recoveries, reduced concentration costs, savings in man-hours and increase in metal reserves.

Other advantages realized through the H. H. Sink Float Process include:

- . . . ability to make closer separation on difficult feeds
- . . . positive control of separation density
- . . . positive removal of float product
- . . . positive removal of sink product
- . . . less power required for operation
- . . . ability to treat coarser sizes
- . . . easier to start after shut-down
- . . . easy to run . . . any mill operator can run it
- . . . low first cost per ton treated

Additional features of this process are:

- . . . rejects coarse waste without grinding it
- . . . produces coarse market concentrate
- . . . permits non-selective mining
- . . . treats metallics as well as non-metallics
- . . . treats mine ores, dumps, fill, development ore
- . . . serves existing and new installations

The H. H. Sink Float Plants are pre-engineered and pre-fabricated with economy in time and construction costs.

It will be to your advantage to explore the possibility of the H. H. Sink Float Process. Let us give you the names of plants now operating this process. Write for further information today.

S F

THE SINK AND FLOAT CORPORATION

100 PARK AVE. NEW YORK 17, NEW YORK

KEEP PRODUCTION *High*

KEEP COSTS *Down*

with this

Modern, Deep Frame,

BIRDSBORO-BUCHANAN

Jaw Crusher

PATENTED

12 OUTSTANDING FEATURES OF BIRDSBORO-BUCHANAN DEEP FRAME JAW CRUSHERS

1 Latest advanced design and construction for maximum production.

2 Completely redesigned all cast steel frame . . . deeper and stronger.

3 New water-jacketed main frame bearings are removable.

4 New aligning rings, on swing jaw frame clamping boxes, speed re-zincing when necessary.

5 All joints accurately machined and doweled for quick assembly in the field.

6 No side movement or shifting of jaw plates (no zincing is required).

7 New arrangement of jaw plate toe lugs permits 50% more wear off plates before they must be replaced.

8 Completely automatic lubrication to all parts of crusher cuts your power and maintenance costs.

9 New, longer swing jaw brings you faster crushing to smaller sizes.

10 Newly designed toggles have renewable flame hardened ends. Can be quickly and cheaply replaced. Eliminates cost of new toggles to correct end wear.

11 Special pitman cuts upkeep and repairs 50%. New design holds weight down to minimum without sacrificing strength.

12 Removable water-jacketed cap, adjustable for wear, allows quick rebabbitting.

Crushers Available in These Sizes

24" x 36"—30" x 42"
36" x 48"—42" x 48"
42" x 54"—48" x 60"
60" x 84"—66" x 84"

World-Wide Agent Representation. Contact home office for address of nearest representative.

Canadian Representative and Manufacturer
JOHN INGLIS & CO., LTD., TORONTO, CANADA

CR-6-51R

BIRDSBORO BUCHANAN JAW CRUSHERS

BIRDSBORO

STEEL FOUNDRY & MACHINE CO.

Birdsboro, Penna.

Designers and Builders of:
Crushing Machinery • Rolls • Steel Mill Machinery
Hydraulic Presses • Special Machinery • Steel Castings

Every Top Management Man... In Every Industry

SHOULD BE ABLE TO ANSWER THESE QUESTIONS ABOUT A MOST CRITICAL EMERGENCY IN OUR COUNTRY'S AFFAIRS

Q. Why is iron and steel *scrap* a matter of importance to me?

A. Steel for our country's military program and civilian economy is being produced at the annual rate of 107,000,000 tons in 1951 . . . 119,500,000 tons expected in 1952. Steel-making capacity is being increased now to meet those quotas.

What Do I Get For My Scrap?

In addition to being paid for your scrap, you remove nuisance inventory from your plant—saving valuable floor space. Also, you have a better chance of *getting* new steel or steel products. But, *most important*—you help alleviate a dangerous condition threatening our country's capacity to rearm and satisfy civilian requirements at the same time.

Q. How does scrap figure in the production of steel?

A. Steel is composed, generally speaking, 50% of pig iron, 25% of "production" scrap (that is, the scrap which is produced as a by-product of steel-making) and 25% of "purchased" scrap.

Q. Is scrap getting scarce?

A. Yes. The supply of *purchased* scrap is not increasing fast enough to meet the needs of increasing steel production.

Q. What if the needed scrap isn't obtained?

A. Open-hearth furnaces will not be able to operate at capacity. That will mean a loss of steel production . . . and fewer products made of steel.

Q. Why not use pig iron instead of scrap?

A. Every ton of scrap conserves approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other vital natural resources—to say nothing of the extra transportation facilities that would be otherwise required.

Q. How can *more* scrap be furnished?

A. By everybody pitching in—as we always do in every emergency—and searching out all possible sources of scrap.

Q. What are these sources?

A. Metal-fabricating plants normally turn over to scrap dealers the scrap left from machining. But there's not enough of this to fill our present enormous need. So everybody—both in and out of the metal-fabricating industries—must sell scrap in the form of *idle metal*.

Every pound of idle metal is needed to keep our steel mills operating at top capacity. Sell your idle metal to a local scrap dealer right away.

What Do I Do *First*?

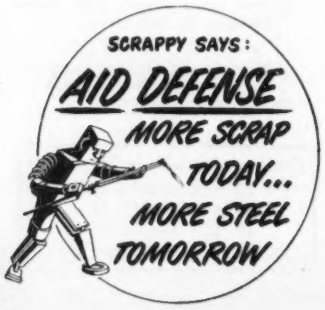
Write for free booklet. It tells how to set up a Scrap Salvage Program in your plant. Thousands of plants are cooperating. Do your part now! Address Advertising Council, 25 West 45th Street, New York 19, N. Y.

Q. *We* don't *produce* scrap—how can *we* help?

A. Scrap is any kind of iron and steel that's gathering dust—obsolete machines or structures, jigs and fixtures, pulleys and wheels, chains and track, valves and pipe—*anything* with rust on it or dust on it. Non-ferrous scrap is needed, too.

Q. What do we do with it when we find it?

A. Use your normal channels or get in touch with a recognized scrap dealer.



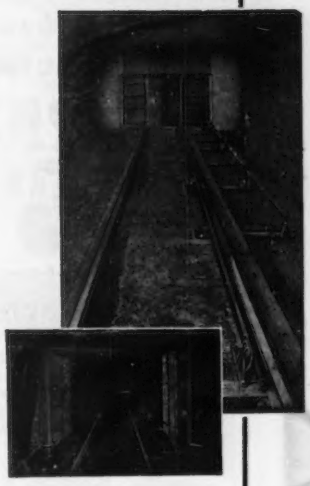
This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET NEW YORK 18, N. Y.

A PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

This Door has saved countless lives . . . increased production by millions of tons . . .



Engineered flow of air sweeps out gas pockets, and air flow must be continuous, reliably directed by "Canton" Automatic Doors. Dissipating explosive air is one important function. Providing healthy, breathable air is another function that steps up productivity of every worker. Eliminating that trapper boy accident is another.

Insurance against accidents, increased haulage, continued speed ahead with "Canton" Automatic Doors make it imperative that every mine owner and manager investigate the economy proven by a quarter century of American Mine Door service.

"CANTON" DOORS ARE SELF LIQUIDATING IN A SHORT PERIOD

Note the photos . . . when the oncoming train rides the trip levers . . . flip, the doors open; when the last car passes . . . release, the doors spring shut . . . positive action and reaction . . . all mechanical in split seconds. Complete literature sent on request, engineering advice given without obligation. When writing, please use street and zone number.

American Mine Door Company

"Dustributors" Automatic Switch Throws
Safety Signal Systems Mechanical Track Cleaners

2039 DUEBER AVE.
CANTON 6, OHIO

The screen that "can take it"

. . . and always give good service

For highly abrasive material, Hendrick Perforated Metal Plate is heat-treated by an exclusive process and maintains uniformity of mesh throughout an unapproached length of service life. That's why it is both most efficient and most economical for vibrating and shaking screens.

The full clearance of Hendrick Perforated Plate minimizes clogging, and the ease with which decks can be changed cuts labor costs. It can be furnished—flat or corrugated—with any desired shape and size of perforations, in proper gauges of tank, high carbon, high tensile, and abrasive-resisting steels, and in other commercially rolled metals.

Write for Hendrick Perforated Plate Catalogue.

1876 — Seventy-Fifth Anniversary — 1951

SEE OUR CATALOG IN SWEET'S

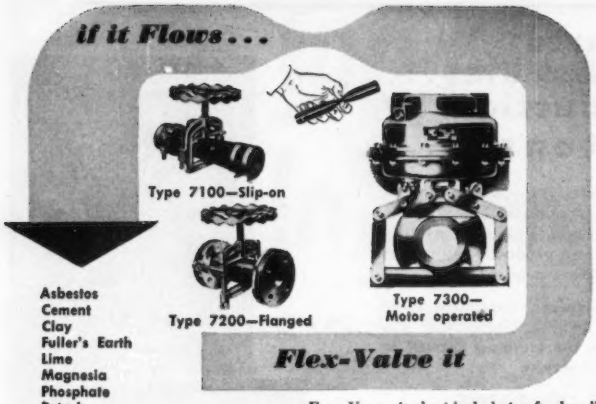
HENDRICK

Manufacturing Company

70 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids



FLEX-VALVE is the ideal choice for handling such materials as those listed—either dry or in suspension—at temperatures up to 210 deg.

Resists both abrasion and corrosion; eliminates clogging, plugging, building up; absorbs vibration and misalignment.

Open—it's as free of obstruction as the pipe itself. Closed—it's bubble-tight and it closes tight on all of these materials.

Available in either hand or air operated types in sizes from ½ to 12 in.

Users have found FLEX-VALVE to be the low-cost solution to tough valving problems. If your present valves aren't 100% effective, take a look at this one. Catalog 455 gives details.

FLEX VALVE

Flexible Valve Corporation

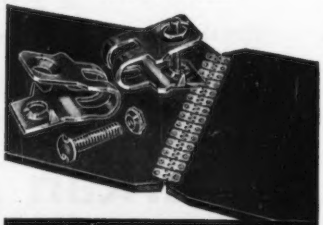
7885 445 COMMERCIAL AVE. • PALISADES PARK, N. J.

HINGED PLATEGRIP
BELT FASTENER No. 500
FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/16" to ½" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular.



ARMSTRONG-BRAY & CO.
5364 Northwest Highway CHICAGO 30, U. S. A.

HARDHED
Diamond
DRILL BITS
J. K. Smit engineers welcome the opportunity to discuss your drilling problems. Special equipment can be made to meet any unusual conditions.
Prompt Delivery • Prompt Resetting Service
J. K. SMIT & SONS
General Offices and Plant: Murray Hill, N. J.
J. K. SMIT & SONS of MICHIGAN
J. K. SMIT & SONS of CANADA

after you've read this magazine

. . . and clipped pertinent ideas, articles and advertisements for reference, *please do not burn or throw it away.*

Here are two sound reasons why:

1) Wastepaper can help to swell the funds of your local Boy Scout Troop, your church or other community organization. It gets a good price these days.

2) Whether in magazine form or not, wastepaper helps to fill the increasing need for paper pulp brought on by the mobilization effort.

Collect it. Give it to your favorite organization. Chances are they have scheduled pick-ups.

PUMP

FLOTATION FROTHS
TABLE CONCENTRATE
COARSE MATERIAL

with the 1½" x 1½ HP

NEW TIW

Vertical Centrifugal

SAND PUMP

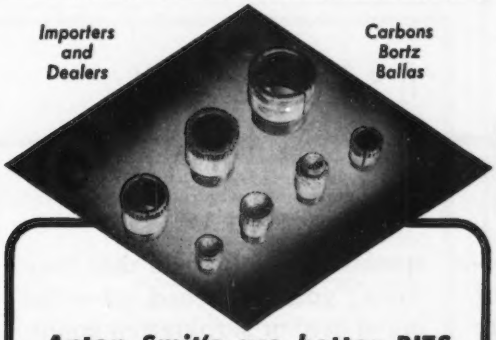
HIGH EFFICIENCY
NON-CLOGGING
LOW INITIAL COST
LOW MAINTENANCE
COMPACT AND LIGHT WEIGHT

Write for New Bulletin

THE TELLURIDE IRON WORKS CO.
P. O. BOX 560
400 Main Avenue, Durango, Colo.

Importers and Dealers

Carbons Bortz Ballas



Anton Smit's are better BITS

The DIAMOND BITS of Anton Smit & Co., Inc. are the best bits because:

1. They have been steadily improved over a 20 year period...
2. Using a Tag-And-Report system whereby the history in use of Anton Smit Diamond Bits is traced, known and employed in further perfecting them...
3. Resulting in superior features, such as the Anton Smit powdered metal matrix that insures even wear and diamond economy.
4. The international scope of our business assures the widest selection of industrial diamonds scientifically chosen for specific uses — the best possible diamonds and matrices for every type of formation and usage—at rock bottom economies.

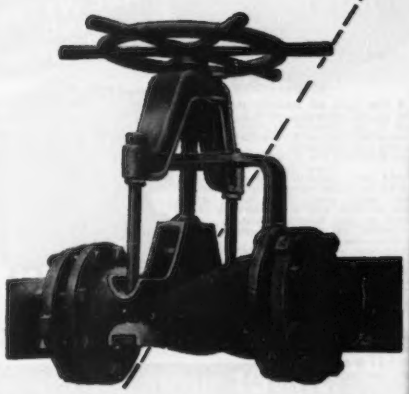
Informative booklets sent free on request.

Est. 1906 **ANTON SMIT & CO., Inc.**
333 W. 52nd St., New York 19, N. Y. Cables: PROFITABLE, New York

Massco-Grigsby
Rubber

PINCH VALVES

Resist Abrasive Pulps

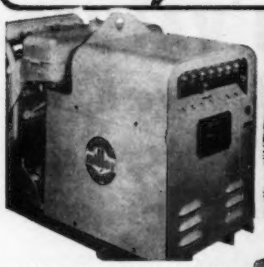


● Severe abrasive and corrosive pulps quickly destroys metal valves while these rubber pinch valves show little wear. They shut tight, even on solid particles. There are no packing glands, and freezing does not damage the patented hinged design sleeve. Sizes 1" to 12" available for continuous pressures up to 100-150 psi.

The **Mine & Smelter** Supply Co.

1442 17TH STREET, DENVER 2, COLORADO
Offices in Salt Lake City, El Paso, 1775 Broadway, N.Y.C. Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago & Lima; The Edward J. Nell Co., Manila, P. I.; The Ore & Chemical Corp., 80 Broad St., New York 4, N. Y., representatives for Continental Europe.

an Arc Welder with its own power plant that can be taken right to the job.....



miller ENGINE DRIVEN A.C. ARC WELDER AND POWER PLANT

A high cycle AC generator that gives you all the advantages of A.C. welding and in its operation is more efficient than a D.C. generator . . . made in two models as illustrated.

AEA-200-L (with 3 KW 110/220 V. Power Supply)

AEA-200 (without Power Supply)

AEA-200-L can be used as an emergency power plant. Both models are built for high duty cycle operation required in pipe thawing service.

..Features that make this welder outstanding—low operation cost . . . low maintenance cost . . . low initial cost . . . weatherproof construction . . . delivers a full 200 amperes . . . will handle AC or AC-DC electrodes from 1/16" to 3/16" inclusive. Powered by the famous Onan 2-cylinder, 4-cycle air cooled engine, directly coupled to the generator for increased efficiency . . . weighs only 435 pounds and can easily be placed in a pick-up truck and taken to the job.

see Your Miller Distributor for complete details and demonstrations.

miller ELECTRIC MANUFACTURING CO. SINCE 1929 APPLETON, WISCONSIN

PLACER GOLD

Most accurately and economically tested for . . . with the

EMPIRE DRILL

NEW YORK ENGINEERING COMPANY

75 West St., N. Y. City, U.S.A. Cable Address NYECO, N.Y.

CORE DRILLING —anywhere!

"We look into the Earth"

- Mineral Prospecting
- Foundation Test Borings and Grouting
- Large diameter holes for Ventilation and Escapeways

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS & MFRS.

1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 1-5816

at your BUSINESS service:

The Classified Advertising Sections (Searchlight Sections) of McGraw-Hill publications are at your service for the satisfying of almost every business need or want.

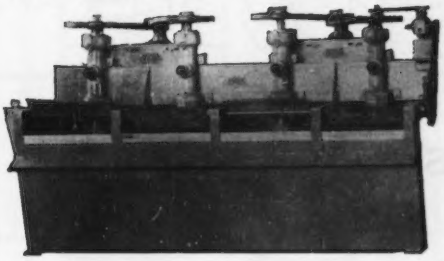
Because these publications are specialized in the field that they cover, your classified advertising of used or surplus new equipment, of securing a position or personnel, of offering or securing business opportunities will reach the right men, quickly and economically.

Classified Advertising Division

McGRAW-HILL PUBLICATIONS, Inc.

330 West 42nd St. New York 18, N. Y.

MORE TONNAGE PER CELL!



WITH BOOTH FLOTATION MACHINES

USERS HAVE REPORTED AS MUCH AS DOUBLE FLOTATION CAPACITY WITH THE NEW, IMPROVED BOOTH FLOTATION MACHINE. TROUBLE FREE OPERATION IS YOURS WITH THIS MACHINE BUILT FOR RUGGED SERVICE.

• *WRITE FOR COMPLETE DETAILS* •

MINERALS SEPARATION • SERVICE • EQUIPMENT

BOOTH ENGINEERS

146 So. West Temple • Salt Lake City 1, Utah

Now you can fasten V-belts by using

ALLIGATOR V-BELT FASTENERS

• Alligator V-Belt Fasteners and open-end (long length) V-belting in rolls will enable you to make up multiple V-belt drives for a wide variety of applications.

Available for B, C and D sizes of V-belting.

Not to be used for repairing endless cord V-belts.

Bulletin V-211 will give you complete details. A copy mailed on request.

Order from your supply house

FLEXIBLE STEEL LACING COMPANY

4635 Lexington St., Chicago 44, Illinois

Also sole manufacturers of Alligator Steel Belt Lacing for flat conveyor and transmission belts and FLEXCO Belt Fasteners and Rip Plates for fastening and repairing conveyor belts.

CLASSIFIED ADVERTISING

for bringing business needs or opportunities to the attention of men associated in administrative, executive, management, sales and responsible technical, engineering and operating capacities with the industries served by

The SEARCHLIGHT SECTIONS of

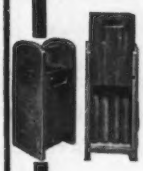
American Machinist
Aviation Week
Bus Transportation
Business Week
Chemical Engineering
Coal Age
Construction Methods & Equipment
Electrical Construction & Maintenance
Electrical Merchandising
Electrical World
Electronics
Engineering News-Record
Engineering & Mining Journal
E & M J Markets
Factory Management and Maintenance
Fleet Owner
Food Industries
Nucleonics
Operating Engineer
Power
Product Engineering
Textile World
Welding Engineer

For advertising rates or other information address:
Classified Advertising Division

McGRAW-HILL PUBLISHING CO., Inc.

330 W. 42nd St., New York 18, N. Y.

HAMMONDS *SAFE* BLASTING EQUIPMENT



EXPLOSIVE BOXES

Approved by the Pa. Dep't. of Mines, these rigid non-conductive explosive boxes represent a prime safety investment. Made entirely of wood—tongue-grooved and dovetailed construction . . . no metal parts. . .automatic lock. . .rubber band spring . . . moisture-resistant. Box sizes are based on 1¼" x 8" sticks.

POWDER BOX PRICES ARE AS FOLLOWS:

No. 9	$2.55 ea.	No. 25	$3.10 ea.
No. 12	2.95 ea.	No. 36	6.50 ea.
No. 16	3.45 ea.	No. 50	7.60 ea.
No. 20	3.90 ea.	No. 72	8.70 ea.

DETONATOR BOX PRICES ARE AS FOLLOWS:

No. 6, size 2½" x 3" x 6" inside...$2.15 ea.
No. 8, size 2" x 2½" x 8" inside... 2.15 ea.

WOOD TAMPING POLES

For Tamping Explosive Shots: Poles are round, made of Hardwood. Sizes to 10' long. Price per lineal ft.: 1" dia. 8c; 1⅛" dia. 12c; 1¼" dia. 14c; 1⅜" dia. 16c; 1½" dia. 18c; 1¾" dia. 28c; 2" dia. 32c. Special diameters and lengths can be furnished. These Poles meet the requirements of the New Federal Mine Safety Code.

SECTIONAL TAMPING POLES

These poles are made of straight grained wood and are coupled together with removable wood pins held in place in recessed grooves by a rubber band and can be quickly connected and unconnected.

Couplers and Head Blocks are 4, 5 and 6 inches in diameter. Please specify size when ordering. Poles are 1½" in diameter.

Head Blocks, $3.70 ea.; Couplers, $3.90 ea.; Poles 12 feet long, $3.60 ea.; Poles 14 feet long, $4.20 ea.; Poles 16 feet long, $4.80 ea.; Poles 18 feet long, $6.30 ea.; Poles 20 feet long, $7.00 ea.; Poles 22 feet long, $8.80 ea.; Poles 24 feet long, $9.60 ea.

J. V. HAMMOND CO., Spangler, Pa.

We also manufacture Shot Firing Units, Wooden Mallet and Wedge Sets, Trolley Poles, Sounding Sticks, Mine Rollers, Insulation Blocks and Brake Blocks

How to read with your eyes open for Business!

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off—by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyers' guide. Read the ads as well as the articles. That's reading with your eyes open for business.

McGRAW-HILL
publications

Don't YOU Forget!

. . . WHITCOMB LOCOMOTIVES are the answer to tough haulage problems.

THE WHITCOMB LOCOMOTIVE CO., ROCHELLE, ILLINOIS

Subsidiary Baldwin-Lima-Hamilton Corporation

LUBRICATION ECONOMY

LUBRIPLATE SAVES 7 TIMES ITS COST!

This remarkable saving was reported to us by the Wolverine Shoe & Tanning Corporation of Rockford Michigan. Their unsolicited letter stated—"*For every dollar we pay for LUBRIPLATE Lubricant No. 100 we save $7.00 in chain replacements*". You, too, can enjoy the savings made possible with LUBRIPLATE Lubricants.

1. LUBRIPLATE reduces friction and wear
2. LUBRIPLATE prevents rust and corrosion
3. LUBRIPLATE is economical to use

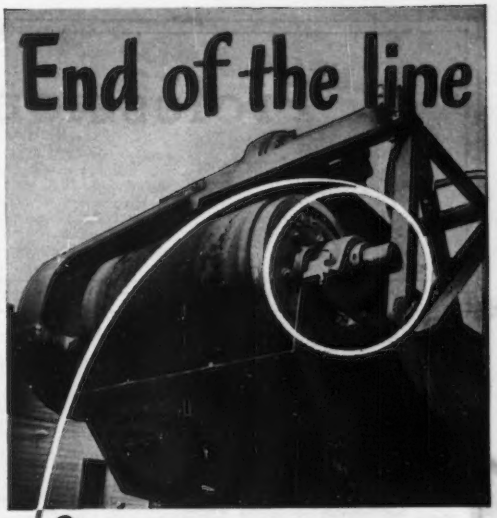
Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N.J. Toledo 5, Ohio

The Different LUBRICANT!

DEALERS EVERYWHERE, consult your Classified Telephone Book

End of the line for tramp metal



Permanent magnets inside pulley cause tramp metal to cling to belt as coal feeds by and drops off. After belt passes underside of magnetized pulley, tramp metal drops into separate bin.

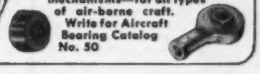
Metallic scrap in coal has long played serious havoc in furnace machinery—industrial or home. But, thanks to this new Homer Permanent Magnet Separator Pulley for coal conveyors, all harmful tramp metal can now be removed while loading for shipment.

Here, as in so much of industry's hard working equipment, you'll find Shafer ConCaVex Pillow Blocks on the job . . . minimizing friction, reducing power consumption, compensating for misalignments, providing reserve load and shock capacities and protection against the ravages of extreme weather, dust and dirt conditions that are part-and-parcel of coal processing operations.

Shafer ConCaVex bearing units (famous for a third of a century) are available in a full range of types and sizes that cover hundreds of industrial requirements—and probably yours. Write for Industrial Bearing Catalog No. 51.

Aircraft Bearings, Too!

Single row, double row, rod end types—for all control mechanisms—for all types of air-borne craft. Write for Aircraft Bearing Catalog No. 50



SHAFER CONCAVEX

SHAFER BEARING CORPORATION
801 BURLINGTON AVE.
DOWNERS GROVE, ILLINOIS

Professional Services

ASSAYING
CONSULTING
PROSPECTING
ORE TESTING

RESEARCH
METALLURGY
MILL DESIGN
MINE MANAGEMENT

AGENCE MINIERE & MARITIME S.A.
Sworn weighers, samplers & Assayers of Ores, Metals. Representatives of shippers at European ports & Works. *Market surveyors and commercial advisers assuring sales direct to consumers*
2, rue Van Bree, Antwerp (Belgium)

JOHN HERMAN
Assayer and Chemist
QUALITATIVE SPECTROGRAPHIC ANALYSIS
I Guarantee Accuracy
I Do Not Guarantee Satisfaction
920 Santee Street
Los Angeles, Calif.

NEW WORLD EXPLORATION RESEARCH & DEVELOPMENT CORP.
Contract Mineral Surveys
Foreign & Domestic
Geological Geochemical
Geophysical Diamond Drill
Integrated Exploration
Room 708 1411 Fourth Ave. Bldg.
Seattle, Washington

VAIL ENGINEERING CO.
Consulting Mining Engineers
Box 59, Platteville, Wis.

BEHRE DOLBEAR & COMPANY
Consulting Mining Engineers and Geologists
11 Broadway, New York 4, N. Y.

HERON ENGINEERING CO.
Surveys, Reports, Designs and Estimates for Mine, Metallurgical and Industrial Installations, Including Power Plants, Railroads, Tramways, Water Supply and Waste Disposal Systems.
2000 South Acoma, Denver 10, Colorado
Chama, New Mexico

ARTHUR NOTMAN
Consulting Mining Engineer
40 Wall St., 19th Floor
New York, N. Y., U.S.A.
Telephone WHitehall 4-4298

WALKER & WHITE, Inc.
Umpire, Assayers, Chemists
Shippers Representatives
409 Pearl St. New York City

BLANDFORD C. BURGESS
Consulting Engineer
Industrial Mineral Specialist
Appraisals Mineral Surveys
Plant Design
Prospecting Development—Efficiency
Ground Water Studies
Box 350 Monticello, Ga.

LEDOUX & COMPANY, Inc.
Metallurgical Chemists — Assayers
Spectroscopists
Samplers - Weighers
Representatives of Shippers of Ores and Metals at Buyers Works
Office and Laboratories
155 Sixth Ave., New York 13, N. Y.

RODGERS PEALE
Consulting Mining Geologists
315 Montgomery Street
San Francisco 4, Calif.

WEISS GEOPHYSICAL CORP.
Mining geophysical surveys with aerial and ground magnetic, gravimetric, seismic, and electrical methods. Experienced crews for systematic work in any part of the world.
149 Broadway Rector 2-6294
New York 6, N.Y. Cable: "Geophysics"

GLENVILLE A. COLLINS
Mining Engineer
Specializing in Uranium Examinations
210 La. Arcada Bldg.
Santa Barbara, Calif.
513 Royal Bank Bldg.
Vancouver, B. C., Canada

KELLOGG KREBS
Metallurgical Engineer
Mineral Dressing Consultant
564 Market St. - Telephone:
San Francisco 4, Calif. SUtter 1-6613

ROGER V. PIERCE
Mining Engineer Specialist
Underground Mining Methods. Cost Cutting Surveys—Production Analysis
Mine Mechanization—Mine Management.
1596 Wasatch Dr., Salt Lake City Utah

HARRY J. WOLF
Mining and Consulting Engineer
Examinations — Valuations — Management
420 Madison Avenue
New York 17, N. Y.
Cable: MINEWOLF
Tel.: Plaza 9-1700

ABBOT A. HANKS, INC.
ASSAYERS—CHEMISTS
Est. 1866
Spectrographic Analysis
Shippers Representative
624 Sacramento Street
San Francisco 11

ROBERT B. McELWAINE
Consulting Mining Geologist
P. O. Box 127
Little Rock, Arkansas

LUCIUS PITKIN, INC.
Mineralogists—Assayers
Chemists—Spectroscopists
SHIPPERS REPRESENTATIVES
Main Office—Laboratories
Pitkin Bldg.—17 Fulton St.
New York 7, N. Y.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mining Systems and Designs
Foreign and Domestic Mining Reports
National Bank Bldg., Wheeling, W.Va.
Union Trust Bldg., Pittsburgh, Pa.

E. LEE HEIDENREICH, JR.
Consulting Engineer
Storage Methods Quarries
Crushing Plants Plant Layout
Milling Plants Appraisals
Concrete Products Plant Design
67 Second St., Newburgh, New York

ARNOLD H. MILLER
Consulting Engineer
General Mine, Mill and Industrial Appraisals
Plant Design, Mechanization and Improvement
Cable: "ALMIL." Tel. Cortland 7-0635
120 Broadway, New York 5

MARVIN J. UDY
Inorganic Chemistry Electrochemistry
Electric Furnace Smelting
Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorus
Telephone 2-6294
546 Portage Rd. Niagara Falls, N. Y.

ECONOMY—
Today and Always
The service of the Consultant is a real economy—with his knowledge of the mining industry and his wide and varied experience, he can usually be of great assistance in coping with your most intricate problems.

PROFITABLE MINE OPERATION

calls for operating efficiency all along the line. These specialists in various phases of mine operation can aid you materially in determining quick, economical solutions to your mining problems that make for more efficient operations, resulting in lower costs and a consequent greater return on your investment. Consult them!

IGNEOUS AND METAMORPHIC PETROLOGY

Just Published!

1. Discusses the origin and evolution of igneous and metamorphic rocks, interpreting them against the same physico-chemical and thermodynamic backgrounds. Treats concepts of equilibrium and stability; kinetics of chemical reaction; mechanisms of diffusion of matter in and between various media; and allied topics in the realm of physical chemistry. Covers evolution and interpretation of fabric of deformed rocks, and the application of facies principle to metamorphic rocks. **By Francis J. Turner and Jean Verhoogen. Both of the Dept. of Geological Sciences, U. of Calif. 602 pages. 92 illus.. $9.00**

PILE FOUNDATIONS

Just Published!

2. **Provides the information required** for the design, driving, and maintenance of pile foundations. Covers the relations between borings, soil mechanics, and pile foundations; the most effective methods for determining pile capacities from driving resistances and friction values; the selection of rigs; the factors affecting choice of pile types; etc. One chapter supplies over 50 actual cases of pile foundation failures, with causes, methods of prevention, and remedies. **By Robert D. Chellis, Structural Eng'r., Stone & Webster Corp., 640 pages, 245 illus., $12.50**

NONMETALLIC MINERALS

3. A complete coverage of nonmetallic minerals—essential as raw materials to the chemical, construction, ceramic, fertilizer, and abrasive industries, as well as other important fields. Explains where nonmetallic minerals are found, how they must be treated for commercial acceptance and use, the size and distribution of markets, and price ranges. **By Raymond R. Ladoo, Consulting Engineer, and W. M. Myers, 605 pages, 18 illus.. $10.00**

MECHANICAL ENGINEERS' HANDBOOK

4. **Revised and Enlarged Fifth Edition of Marks' Handbook gives quick answers to your most troublesome questions** on mechanical engineering and its applications. Helps you check your methods against today's best accepted practices. Supplies data on every branch of mechanical engineering—from power generation to welding—from metal-cutting to hoisting and conveying. **Edited by Lionel S. Marks, Gordon McKay, Prof. of Mech. Eng., Emeritus, Harvard Univ. 5th Ed. 2236 pages, about 2000 illus., $15.00**

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Inc.
330 W. 42 St., NYC 18

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus a few cents for delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

- ☐ 1. Turner & Verhoogen—IGNEOUS AND METAMORPHIC PETROLOGY $9.00
- ☐ 2. Chellis—PILE FOUNDATIONS $12.50
- ☐ 3. Ladoo & Myers—NONMETALLIC MINERALS $10.00
- ☐ 4. Marks—MECH. ENG. HANDBOOK..... $15.00 (payable $3.00 in 10 days and $3.00 monthly)

(Print)
Name .....
Address .....
City ..... Zone.... State.....
Company .....
Position J-11

This offer applies to U.S. only.

PICK YOUR POWER with

The NEW Acker Teredo Drill...

No temperamental prima-donna is Acker's new, versatile Teredo Core Drill—*it performs efficiently with any power plant.*

And for dependable, low-cost, trouble free operation anywhere in the world—Acker design and construction can't be beat.

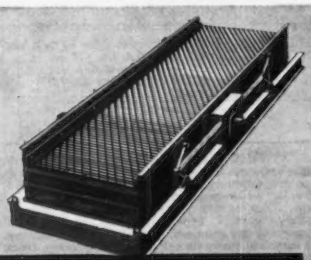
See for yourself—write for Bulletin 33, E.M.

Over 30 years' experience in the design and development of Drilling Equipment.

ACKER DRILL CO., INC.
SCRANTON 3, PA.

If your present screens don't give you these 9 SCREENING ADVANCES

You're in the market for a SCREEN-ALL Vibrating Screen



IDEAL SCREEN HAS:	LIPPMANN SCREEN-ALL GIVES IT TO YOU:
SHARPER SIZING ACTION	Perfect circle throw is possible because entire weight of body is carried by shaft. True circular motion gives maximum tumbling—every particle contacts cloth more frequently on all faces for highest efficiency.
HIGHER CAPACITIES	With a greater component of force perpendicular to deck, maximum bed stratification is achieved. No ganging up, no blinding—positive vibration equalizer transmits identical vibratory motion to all of deck.
LOWER FIRST COST	Advanced engineering of SCREEN-ALL gives unmatched simplicity of construction. All parts are made from jigs.
LONGER LIFE	With no unbalanced forces during entire operating cycle, SCREEN-ALL gives many years of efficient performance.
LESS HEAD ROOM	Because bearings are outside screen body, shaft can be mounted close enough to deck to save up to 8 inches height.
LIGHTER SUB-STRUCTURE	LIPPMANN SCREEN-ALL transmits no vibration to supporting structure. No side or end springs, no guy cables needed.
EASIER INSTALLATION	New three-point support makes setting up the SCREEN-ALL a simple task even if supporting structure is not exactly level. Body is mounted on frame precisely at factory.
REDUCED MAINTENANCE COSTS	Bearings are mounted only 7/8 in. apart. Bending moment is sharply reduced. Hub-mounted bearings are much larger than shaft-mounted bearings on comparable screens.
GREATER FLEXIBILITY	SCREEN-ALL handles wide range of materials and sizes. Slope can be varied quickly, rotation reversed, throw changed by switching hubs, quick-change decks easily substituted. 2006

LIPPMANN ENGINEERING WORKS
4603 West Mitchell St., Milwaukee 14, Wisconsin

For all the facts, write for Bulletin 1200

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • **OPPORTUNITIES** • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.20 a line. Minimum 3 lines. To figure advance payment count 5 average words as a line. (See ¶ on Box Numbers.)
POSITION WANTED and Individual Selling Opportunity undisplayed rate is one half of above rate, payable in advance.
PROPOSALS, $1.20 cents a line an insertion.

INFORMATION:

BOX NUMBERS count one additional line in undisplayed ads.
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $9.75 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches —to a page.

NEW ADVERTISEMENTS received by 10 A.M. November 23rd at the New York Office, 330 W. 42nd St., N. Y., will appear in the December issue subject to the limitations of space available.

WANTED

Rock Crushing and Milling Manufacturer requires graduate Engineer for production work. Industrial experience in crushing and milling essential. Mechanical aptitude desirable. Applicant to include all details and salary desired in first letter.

P7942, Engineering & Mining Journal
330 West 42nd St., New York 18

REPRESENTATIVES WANTED

Substantial English concern introducing revolutionary proven engineering product, invites correspondence with qualified engineers selling engineering equipment to Gas Works, Iron and Steel Works, Steam Power Stations, Mines, Quarries, etc., in the States of N. Y., Pa., Ohio, Ill., Mass., Conn. and N. J., view Representative.
RW 1908 Engineering & Mining Journal
330 W. 42 St., New York 18, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

U.S. ATOMIC Energy Commission desires graduate engineer, 28-35 years old, for work covering some ore sampling, ore production, and pilot and full-scale hydro-metallurgical plants. Location—south. Four or five years practical experience in ore-dressing and beneficiation or in chemical engineering are required. Familiarity with mining and sampling methods helpful. Salary range from $5400-$6400 per annum. For further information please write to George M. Gableman, U.S. Atomic Energy Commission, 1901 Constitution Avenue, N.W., Washington 25, D.C.

ASSISTANT HYDRAULIC Engineer with some field experience, in construction of hydro-electric power plant projects etc. for large Copper Company Chile, South America. Civil Engineering graduate preferred. 3-year contract. Transportation both ways and salary while traveling paid by Company. In reply give complete details. P-1997 Engineering & MJI.

FIELD ENGINEER wanted for progressive and growing manufacturer of rock loading and material handling equipment; also mine supplies. Excellent opportunity for growth and development in the organization. Mechanical aptitude desirable. Sales Engineering necessary. Territory includes southern states with headquarters in Birmingham. Write reply and interview may be arranged at mutual convenience. P-2155, Engineering &MJI.

WANTED—LARGE Company seeking recent graduate Mining Engineers interested work Mexico. Single men provided furnished room rent free, married men adequate rent free furnished housekeeping accommodations. Work involves surveying surface underground, mapping, sampling, geology. Opportunity subsequent transfer operating work in case of preference. Send full particulars 1112 Mills Bldg., El Paso, Texas.

MANUFACTURING EXECUTIVE WANTED

GENERAL OPERATING MANAGER, TO RUN A MEDIUM SIZE PLANT PRODUCING FERRO-ALLOY COMPOUNDS.
NATIONALLY KNOWN CLIENT, CURRENTLY EMPLOYING 300 PEOPLE, EASTERN LOCATION.
CAREER OPPORTUNITY FOR ABLE ADMINISTRATOR, 35 TO 45, WITH PROVEN OPERATING RECORD, AND HAVING A METALLURGICAL, CHEMICAL OR MECHANICAL ENGINEERING BACKGROUND.
COMPENSATION IN NEIGHBORHOOD $15,000. WRITE OR TELEPHONE. NEGOTIATIONS HANDLED IN STRICTEST CONFIDENCE AS CLIENT'S COUNSEL.

WESTON RICHARDSON AND ASSOCIATES
Management Consultants
ELEVEN WEST 42ND STREET
NEW YORK, 18, NEW YORK
CHICKERING 4-0106

REQUIRED FOR EXECUTIVE POST IN MALAYA. Highly qualified and practical Mechanical Engineer with managerial and administrative experience. Age 35 to 40 years. Good terms and generous salary offered. Attractive to any man now holding a responsible position but seeking further advancement in his profession. Applications stating age, experience, qualifications and any other relevant particulars should be sent to Box 5607 Walter Skinner Ltd., 20 Copthall Avenue, London, E. C. 2.

POSITION WANTED

MINING GEOLOGIST 32, MS degree—four years experience with large corporation in open pit and underground geology, examinations, exploration and development programs—Married. Available December 1st. PW-2169, Engineering &MJI.

BUSINESS OPPORTUNITIES

Copper Property,

unlimited possibilities. Party desiring to lease, must furnish A 1 reference as to ability, to operate. BO-2103, Engineering & MJI.

Finance Wanted

Will sell one half interest in Tungsten (scheelite) mine for mill, mine machinery, etc. 33,750 tons proven ore developed and in sight averaging .77% WO3; 24.80 ozs. Silver; 5.80% Copper; .04 ozs. Gold. 426,000 tons ore in sight ready to be mined. Tunnel mine well developed. Four strong well mineralized parallel quartz veins 4 to 5 feet width outcropping 4,000 feet. Excellent economics. Water and mill site on property for mill. Good road. Close to railway. All year operation. Mine highly approved by eminent engineer. Good profits assured. Block of proven ore should Net $1,687,500.00. Will stand fullest investigation. BO-2267, Engineering & MJI.

For Sale, Lease,

or partners needed with modest funds—Large copper, gold, lead, silver mine at Cobalt, Idaho. Suitable to block caving or quarrying. Outcrop zone two miles long & 1,600 feet wide. Depth proven. Fully equipped & two mills. No debts. Patented. DMA copper-lead loan recommended by U.S. engineers. Best 20 acres large residual gold placer $3.30 per yard throughout. Reports available. Y.J. Mines, 2608 Warring St., Berkeley 4, Calif., phone BErkeley 7-5911. (In Los Angeles phone PYramid 1-2334, E.F. Steen).

PATENTS

CONSULT: Z. H. POLACHEK

Reg. Pat. Attorney, 1234 Broadway, New York 1, N. Y.

MINING PLANT DESIGNER

Over thirty years broad mining experience. Graduate Mining Engineer, Registered Mechanical Engineer, Experienced Structural Engineer.

Member AIME, NSPE, Tau Beta Pi. Fully experienced in all phases of design, from initial plant layout to final details. Excellent references.

At present employed, but available on reasonable notice.

PW 1867 Engineering & Mining Journal
520 N. Michigan Ave., Chicago 11, Ill.

WANTED

Large engineering firm wishes to acquire several complete plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment whole or in part. Personnel retained where possible, strictest confidence. *Box 1231, 1474 Broadway, New York 18, N.Y.*

SURFACE MINING CONTRACTS WANTED

Contractor desires contracts, no share or percentage proposals, for open pit mining and surface development including access roads in Western United States. Have modern machinery and experienced personnel.

J. HENRY HARRIS
2657—9th St., Berkeley 10, Calif.

OPEN PIT MINING

Contractor with excellent equipment and experienced personnel interested in excavating, material handling, or open pit mining work.

CW1319 — Engineering & Mining Journal
330 W. 42nd St., New York 18, N. Y.

ROCKS AND MINERALS

a magazine for collectors.

If you collect rocks, minerals, sands, pebbles, crystals, ores, gems, ROCKS AND MINERALS is your magazine. Founded 1926. Issued once every two months. 112 pages per issue. $3.00 a year (sample copy 60¢).

ROCKS and MINERALS
Dept. MJ, Box 29, Peekskill, N.Y.

FOR SALE

Complete assay laboratory for small mine. Bargain priced. Send for Inventory.

J. BUREN EVANS
Searchlight, Nevada

TO HELP YOU . . .
find equipment you need
"Searchlight" Advertising

DEPENDABLE EQUIPMENT AT A SAVINGS IN TIME AND COST

TUGGER HOISTS

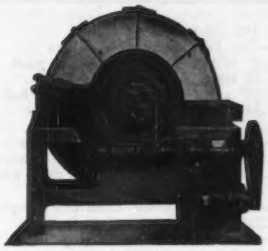
1—2 drum Ingersoll-Rand air tugger hoist, size KML-2G
1—Dillon-Box single drum air tugger hoist, model 3
2—Ingersoll-Rand single drum air tugger hoists, model GHC
1—Ingersoll-Rand 2 drum electric slusher hoist, size 5NN-01-1
1—Sullivan single drum electric tugger hoist, class RH
1—Ingersoll-Rand single drum electric tugger hoist, size 107
1—Ingersoll-Rand 3 drum electric tugger hoist, model 10NNN2G
1—Sullivan 2 drum electric slusher hoist, model B-211
1—Ingersoll-Rand new 3 drum electric slusher hoist, size 20-MNM-20
2—Sullivan single drum electric tugger hoists, D.C. type HE
9—Sullivan double drum electric tugger hoists, D.C. type HDE

LOCOMOTIVES

1—2-2½ ton Whitcomb battery, 24" gauge
2—7 ton G.E. permissible type battery, 36 gauge
2— 8 ton G.E. battery, 36" gauge
4—10 ton Atlas battery, 36" gauge
1— 3 ton Whitcomb gas engine driven, 24" gauge
1— 3 ton Ruth gas engine driven, 18" gauge
1— 6 ton Goodman trolley, 36" gauge

AGITATORS

3—Dorr type H agitators for 22' dia. tank 14' high
4—Devereux type agitators, 8' x 8'
4—Devereux type agitators, 10' x 10'



FILTERS

1—4' x 6' Morse drum filter
1—6' 2 disc. American filter
2—8' x 12' Eimco drum filters
1—4' single disc Oliver filter
1—18" Morse round pattern filter press
1—36" Merrill triangular filter press
1—#12 Sweetland 36 leaf filter press

BALL MILLS

2—3' x 2' Marcy ball mills
1—4' x 4' New standard ball mill
1—8' x 22' Hardinge conical pebble mill
1—5' x 4' Colo. Iron Works ball mill
1—3' x 8' Marcy Rod Mill

LOADERS

2—12B Eimco rocker shovel loaders
1—#20 Eimco rocker shovel loader
2—#21 Eimco Rocker shovel loaders
4—#50A Conway muckers

BLOWERS

1—#8H 42" Jeffrey "Aerodyne" mine fan.
1—6½" x 22¾" Roots rotary blower.
1—8½" x 29¾" Roots #1 rotary blower.
1—24" x 78" Roots #7 rotary blower.
1—American #7 "Sirocco" exhaust blower.
12—American New HS blowers direct driven by 7/12½ HP Wagner Motors.
2—#250 D.F.C. pressure blowers.
3—Buffalo #50 steel plate ventilating blowers.

DIESEL ELECTRIC GENERATORS

3—15 KW sets, Century Generators, Waukesha-Hesselman diesel engines.
1—30 KW set, Century Generator, Buda diesel engine.
1—74 KW set, General Electric Generator, Caterpillar D-13000 diesel engine.
1—121 KVA Fairbanks-Morse diesel generator set.

SAND PUMPS

1—1" Wilfley sand pump
1—2" Denver vertical sand pump
3—2" Telluride sand pumps
1—2½" Traylor sand pump
1—3" Allen-Sherman-Hoff rubber lined hydra-seal
1—3" Wilfley sand pump
1—3" Telluride sand pump
1—4" Allen-Sherman-Hoff hydra-seal
1—4" Denver vertical sand pump
1—6" Wilfley sand pump

JAW CRUSHERS

1—8" x 24" Rogers
1—8" x 36" Universal
1—9" x 36" Cedar Rapids
1—13" x 24" Telsmith
1—15" x 28" Pacific
1—8" x 8" Universal
1—9" x 15" Farrell

BETTER MACHINERY — IT'S FULLY RECONDITIONED

ESTABLISHED 1898

MORSE BROS. MACHINERY CO.

P.O. BOX 1708 DENVER, COLORADO, U. S. A. CABLE "MORSE"

COMPLETE ORE-MILLING PLANTS · CONCENTRATION · FLOTATION · MACHINERY · CYANIDE · AMALGAMATION

General Office and Plant 1900 BRIGHTON BLVD., DENVER, COLO.

HAULING EQUIPMENT!

18—20 cu. yd. Western End Dump Trucks, Rock Bodies powered w/ Cummins Mod. HBS6 Engines.... $7750.00 Each

12—16 cu. yd. Utility End Dump Trailers w/ Mod. 355DT Peterbilt Tractors powered w/ Hall Scott Engines. $14000.00 Ea.

20—26.7 cu. yd. Southwest Bottom Dump Trailers w/ Model 355DT Peterbilt Tractors powered w/ Cummins 6NHB Engines ..... $16500.00 Ea.

All units ready to go to work!
For further specifications wire, call, or write

GUY F. ATKINSON COMPANY

10 W. Orange Avenue
So. San Francisco, Calif.
Phone — JUniper 4-8120

AIR COMPRESSORS
9 Electric 5,000, 3,865, 3,178, 2,260, 1,578 & 1,382 1,090, 676 & 500 Ft.
6 Diesel 1,578, 1,000, 676 & 500 Ft.
LOCOMOTIVES AND CRANES
12 Diesel 100, 80, 65, 45, 30, 20 Ton Locomotives.
22 Gas, 35, 25, 18, 12, 8 & 6 Ton Locomotives.
40 Ton Orton Diesel Locomotive Crane.
R. R. CARS
100 Dump Cars, 2, 4, 12, 20 and 30 Yd.
100—60 Ton Flat Cars. 66—50-Ton Gondolas.
150—8,000 & 10,000 Gal. Cap. Tank Cars.
TUNNEL MUCKERS — LOADERS
4 Gardner Denver GD9 & GD14.
10 Eimco 12B & 21, 4 Sullivan HL20.
LARGE JAW CRUSHERS
7—60x84", 48x66", 36x42", 24x36" & 28x36".
ROTARY DRYERS AND KILNS
48"x20', 48"x45', 54"x40', 60"x50', 70"x45', 80"x60', 84"x36'
Single and Double Shell.
Kilns, 6'x60', 4'x45' & 9'x170'.
BALL, ROD & TUBE MILLS & CLASSIFIERS
2—5'x22' A.C. Tube Mills
3'x22', 5'x22', 6'x18', 8'x22' & 8'x36" Hardinge Conical Ball Mills.
4x4, 6x6 & 7x5 Cylindrical Ball Mills.
5', 10' & 16' Mechanical Air Separators.
36" & 78" Spiral and 4' Dorr Rake Classifier.
4x10, 5x12, 7x16 Rod Mills, Marcy, Hardinge.
Cottrell Precipitator 108,000 CFM.
Diago 3-stage 18" Wetherill Mag. Separator.
200, 400 & 700 HP—Double Drum Mine Hoists.
75, 300, 450, 500 & 700 HP Single Drums.
STEEL STORAGE TANKS
40—10,000 Gal. R. R. Car Tanks.
PULVERIZERS
Hercules Jr. & #1 & 2 Ring Roll.
STANHOPE, 60 E. 42nd St., New York 17, N. Y.

FOR SALE

Mining Machinery, Equipment, T. Rail, Hoists, Headframe, Ore Bin, Pumps, Compressor, Diamond Drill, Rods, Ball Mill, Flotation Cells, Assay Supplies, Cable, Stopers, Drills, Etc.

SPRING HILL CORPORATION
Box 1001, Grass Valley, California

ELECTRICAL CABLE

- for every industrial and power application.
- Special construction. Odd lengths.
- Large stocks on hand of high voltage, lead covered cables not ordinarily stocked by your regular suppliers.
- Cut to length. Reasonably priced.

UNIVERSAL Wire and Cable Co.
2674 N. Clybourn Ave. Chicago 14, Ill.

HL-20 LOADER

JOY (SULLIVAN) HL-20
SHOVEL LOADER FOR LARGE DRIFTS, 3 TONS PER MINUTE
Guaranteed 95% New

COST $4880.00
OUR PRICE 3500.00

F.o.b. Chicago

CENTRAL CONTRACTORS SERVICE, INC.
GEORGE A. CARLSON, Pres.
1150 N. North Branch St. Chicago 22, Ill.

Rotary Kilns—8½' x 60'—8½' x 9½' x 200'.
Rotary Dryers—3' x 30'—4' x 30'—5' x 40'—5½' x 50'—6½' x 80'—8½' x 70' & 7½' x 70'.
Tube & Ball Mills—6' x 8'—5' x 22'—5½' x 16'.
Fuller-Lehigh Mills—22"—42" & 52"—Bradley Mills.
Jaw Crushers—From 10" x 6" up to 30" x 24".
Crushing Rolls—From 18" x 12" up to 72" x 28".
1—Complete Linel Hydrating Plant.
Sturtevant Rotary fine crushers—No. 0—No. 1—No. 1½ and No. 2.
Ring Roll Mills—Sturtevant No. 1—No. 2 duplex.
15'—16' & 18' Herreshoff furnaces.
Gyratory Crushers, No. 3 and No. 12.
5' & 6' Gayto — 6' & 9' Raymond Whizzer Air separators.
Magnetic separators—Jigs—screens—classifiers and thickeners.
5', 6' & 7' dia. Rod Mills. Mine Hoists.
8' x 10'—8' x 12'—11½' x 19' Rotary Filters.
1—6' Raymond "Whizzer" Separator.
New Dryer and Kilns.

W. P. HEINEKEN
50 Broad Street, New York

HOISTS
1—#21½ Vulcan Sgl. Drum, with U-6 Gas Power Unit, condition like new
1—15 HP Box I. Wks. Sgl. Drum with 15 HP Slip-ring Motor
1—#6½ Vulcan Hoist
1—7½ HP Hoist with Motor

CRUSHERS
1—9 x 40 Austin-Western Jaw Crusher
1—10 x 20 A.C. Blake Crusher

FLOTATION MACHINES
2—#24, 8-cell Denver "Sub-A"—43"x43" cells—wood tanks, complete with motors and new rubber impellers

AIR RECEIVERS

1—30" x 8'	1—36" x 7'
1—30" x 10'	1—36" x 8'
1—36" x 6'	1—42" x 10'

MISCELLANEOUS
1—Sullivan LW-6 Wagon Drill with Dings Drifter—on steel wheels
3—37½ KVA Pittsburgh Transformers 440-110/220 volts
3—Gen. Eng. Wet Sample Cutters
4—2" Wilfley Sand Pumps—acid proof
1—50 HP Upright Boiler
1—32" x 16" F. M. Davis Crushing Roll
1—24" Denver Cone Reagent Feeder
1—30" x 48" Ball Mill
1—50 Ton Truck Scale—44' platform
1—12" x 18" Duplex Hartz Jig with motor
1—D-4400 Cat. Diesel V-belted to 30 KVA 220 volt AC Generator
1—60" x 23' Denver Cross-flow Simplex Spiral Classifier
1—12" x 30" Suspension Type Jeffrey Viv. Feeder
25 Tons 85# Relayers
10 Tons 65# Relayers
7 Tons 16# Rail
Enclosed Safety Switches
Revolving Screens
Motor Mounted & Hydroseal Pumps
Deep Well Pumps

SEND FOR BULLETIN NO. 10

FLORENCE MACHINERY & SUPPLY CO.

Suite 904 Equitable Bldg. C. J. Parrish, Mgr. Denver 2, Colorado

• AERIAL TRAMWAY
5 MILE CONTINUOUS LENGTH WITH TOWERS AND BREAKOVERS TO FIT ANY CONTOUR

- ELECTRIC MOTORS
- ELECTRIC GENERATORS
- CRUSHING EQUIPMENT
- GRINDING EQUIPMENT
- MINING EQUIPMENT
- PORTABLE COMPRESSORS
- STATIONARY COMPRESSORS
- MINE HOISTS—HEADFRAMES
- ROCK DRILLS—ALL TYPES

SEND FOR COMPLETE EQUIPMENT LISTS OR STATE YOUR NEEDS

MILLER MACHINERY CO. Box 1496
MISSOULA, MONT.

MINING — MILLING — BARGAINS
ALL SIZES—Turbine pumps, crushers, rolls, steel jigs, Eimco and Sullivan loaders, drifters, jackhammers, hoisters, electric motors, concentrating tables, filters, float machines, thickeners, Mancha trammers.

Sample Bargains

1—Sullivan HL3 rocker shovel — good operating condition, only—$795
10—Gardner-Denver 4" automatic feed drifter drills — excellent condition — Late models List $1,190 only—$395
2—Allis Chalmers gyratory crushers only—$850
1—Caterpillar D11000 engine — good operating condition only—$1,295
1—Eimco 102 Caterpillar diesel loader, List $9,045 only—$4,995
1—50 KVA diesel electric plant, portable, like new only—$1,995
2—Late model 315 CFM portable air compressors—60% off list.

JOPLIN MACHINERY & ELECTRIC CO.
5th & School Sts. Joplin, Missouri

MOTORS, GENERATORS, TRANSFORMERS
1 — 1500 H.P.
Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

FOR SALE
New Roebling Tramway Track Cable.
7700 feet 1-½" Smooth Coil 1 x 37
1860 feet 1-½" Smooth Coil 1 x 37
1516 feet 1-½" Smooth Coil 1 x 37
1516 feet 1-¾" Smooth Coil 1 x 37
1516 feet ⅞" Smooth Coil 1 x 19
Available at Lowell, Vermont. Inquiries Invited.
FS 2332 ENGINEERING & MINING JOURNAL
330 W. 42 St. New York 18, N.Y.

RAILS-TIES
TRACK ACCESSORIES

RELAYING RAIL
All Sizes
Track Accessories
LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

WANTED

BUYERS OF SURPLUS COPPER, INSULATED WIRES AND CABLES
No lengths too long or too short.
Telephone: EAstgate 7-4778
PIERCE CABLE CO.
2674 Clybourn Ave., Chicago 20, Ill.

American, Clyde, Colby Whirley gantry cranes (5). Walking draglines, diesel, 10-yd., 6-yd., 3-yd. Rear & bottom dump Euclids, 15, 22, 32-ton. Dump Cars. Dumpsters. Super C. Tournapulls. Rotary Dryers, 4'x40', 7'x8'x72', 9'x10'x170'. Power Shovels, elec., diesel, gas, 1¼ - 10 yds. Locomotives, 7 to 65 ton, diesel, gas, steam. Crushers: Jaw, gyratory, 18" to 48" (7). Diesel-elec. generators, 100 to 875 KW. H. Y. Smith Co., 828 N. B'way, Milw. 2, Wis.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946
(Title 39, United States Code, Section 233)

Of Engineering and Mining Journal, published monthly, at Philadelphia, Pa., for October 1, 1951.

1. The name and address of the publisher, editor, managing editor, and Adv. Sales manager is: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 18, N.Y.; Editor, Evan Just, 330 West 42nd St., New York 18, N.Y.; Managing editor, A. H. Hubbell, 330 West 42nd St., New York 18, N.Y.; Adv. Sales manager, R. W. Davis, 330 West 42nd St., New York 18, N.Y.

2. The owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 18, N.Y.; Stockholders holding 1% or more of stock: Curtis W. McGraw and Donald C. McGraw, Trustees for Harold W. McGraw, Curtis W. McGraw and Donald C. McGraw, all of 330 West 42nd Street, New York 18, N.Y.; Curtis W. McGraw and Harold W. McGraw, Trustees for Catherine M. Rock, 330 West 42nd Street, New York 18, N.Y.; Curtis W. McGraw, 330 West 42nd Street, New York 18, N. Y.; Donald C. McGraw, 330 West 42nd Street, New York 18, N.Y.; Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas Street, LaJolla, California; Touchstone & Company, c/o The Pennsylvania Company, 15th and Chestnut Streets, Philadelphia 1, Pa.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

McGRAW-HILL PUBLISHING COMPANY, Inc.
By J. A. Gerardi, Vice Pres. & Treas.

Sworn to and subscribed before me this 6th day of September, 1951.
[SEAL] ELVA G. MARLIN.
(My commission expires March 30, 1953.)

IF THERE IS
Anything you want
that other readers of this paper can supply
OR—
Something you don't want
that other readers can use, advertise it in the
SEARCHLIGHT SECTION

MOTORS—M. G. SETS—TRANSFORMERS

SQUIRREL CAGE MOTORS—3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1	400	G.E.	1K	2200	514
1	400	G.E.	KT-412	2200	435
2	300	Whse.	CS-890	2300	1780
1	200	Whse.	CS-873C	2200	1160
1	200	Al.Ch.	AR	440/220	580
1	125	Al.Ch.	AR	2200	1750
1	125	Whse.	CS-761C	440/220	1750
1	125	C.W.	126-Q	440/220	430
2	100	Whse.	CS-663C	440/220	1750
1	100	G.E.	1K	440/220	1800
1	100	Al.Ch.	AR	2200	1160
1	100	Al.Ch.	AR	550	690
1	100	F.M.	HH61B	440/220	435
1	100	Whse.	CS-938	2200	495
1	78	G.E.	I-K15	440/220	570
1	75	Al.Ch.	AR	2200	1765
1	75	Al.Ch.	AR	2200	1750
1	75	Al.Ch.	AR	2200	690
1	50	G.E.	KT	440/220	1160

SYNCHRONOUS MOTORS—3-Ph., 60-Cy

Qu	HP	Make	PF	Volts	RPM
1	3000	Whse.	80	4800/2400	720
1	700	G.E.	80	2300	720
1	600	Whse.	80	2400	720
1	400	Whse.	80	440	600
1	300	Whse.	80	440	514
1	150	G.E.	100	2300	900
1	150	G.E.	100	550/2200	600
1	150	G.E.	80	550/2200	450
2	125	El.Mchy.	100	4800/2400	900
1	125	G.E.	80	2200	900
2	100	Whse.	80	440/220	1800
1	100	Whse.	100	2200	1200
1	100	Ideal	80	220/440	900
2	100	G.E.	80	220/440	600

SLIP RING MOTORS—CONSTANT DUTY—3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1**	3000	G.E.	MT	2200	356
1**	1200	C.W	SR	2200	327
2**	1000	Al.Ch.	ANY	2200	235
1**	600	G.E.	MT-20	2200	360
1**	400	Al.Ch.	ANY	2200	514
2	300	G.E.	I-16-M	2300	450
2	400	G.E.	MT-412	2200	450
1	300	G.E.	I-15-M	2200	1200
1	300	Al.Ch.	ANY	2200	514
1	250	Al.Ch.	ANY	440	585
1	250	G.E.	MT-414	2200	300
1	200	G.E.	I-16-M	2200	585
1	150	G.E.	I-13-M	2200	1750
1***	125	Whse.	CW-870	2200	870
1	100	F.M.	H20C	440/220	900
1	75	G.E.	IM	440/220	695
1	75	Whse.	CW-7540	440/220	690

** Mill type pedestal bearing. *** 3 bearing.

MOTOR GENERATOR SETS

Qu	KW	Make	RPM	Volts DC	Volts AC
1	2400(3-U)	Al.Ch.	720	525	4800/2400
1	2400(3-U)	Whse.	720	600	4800/2400
1	1500	Whse.	514	250	4600/2300
1	1000	G.E.	514	550	2300
1	500	C.W.	720	250/275	2300/440
2	500	C.W.	720	575	2300/440
1	250	Whse.	1200	125/250	2300
1	200	Ridgway	900	275	2200
1	155	G.E.	720	250	2300/440
1	150	G.E.	1200	300	2300/440
1	100	C.W.	1200	125	440/220
1	100	Delco	1200	125/250	440/220
1	100	Ridgway	1200	275	4000/2300
1	85	C.W.	1700	250	2300/440
1	75	Star	1200	230	440/220
1	75	Al.Ch.	900	250	2300
1	75	Whse.	900	75	2200
1	25	Ideal	1750	125	220
1	20	Al.Ch.	1200	250	440/220
2	15	Al.Ch.	1200	250	440/220
1	15	G.E.	1200	250	440/220
1	10	Whse.	1200	250	440/220

3-U — 3-unit set.

We can furnish any of the above sets with exciters and VARIABLE VOLTAGE CONTROL engineered and rebuilt for your requirements.

TRANSFORMER — Power

Qu	KVA	Make	Type	Phase	Voltage
1	2760	G.E.	DH	3	6900-240/480
3	500	Whse.	S	1	11500-2400
6	333	G.E.	H	1	13200/11000-2200
3	250	Packard	A	1	13200-2200
3	150	G.E.	H	1	19000/9500-550/2200
3	100	G.E.	H	1	3300-2300
3	100	Whse.	SS	1	12075/10935-230/460
3	50	Al.Ch.	O.I.S.C.	1	22000-220
2	50	Wagner	HE	1	13200/11880-575/287
2	37½	Uptegraff	HD	1	2300-115/230

DIRECT CURRENT MOTORS

Qu	HP	Make	Type	RPM
1***	3000	Whse.	Encl.(Rev.)	600
1***	2400	Whse.	Encl.(Rev.)	600
4***	1500	Whse.	Encl.(Rev.)	600
4***	1200	Whse.	Encl.(Rev.)	600
4***	800	Whse.	Encl.(Rev.)	600
1	350	G.E.	CD-169	1150
1	325	Whse.	QM-660. 6	450/900
1	200/250	El.Dy.	No. 22	600/120
1***	200	G.E.	MFC	500/1200
1	200	Whse.	MIB	300/1200
1	300	Whse.		240/300
1	180	G.E.	MPC	600
2*	150	C.W.	83-H	890
1***	125	Whse.	SK-190	600
2	125	Whse.	SK-184	575/850
1	100/125	Rel.	1995-F	500/1200
2	100	Rel.	1050-T	400/1200
1	90/160	G.E.	MPC	625/1125
1*	50/75	Rel.	1995-F	300/1200
1	35	G.E.	RF-14	500/1500
1	35	G.E.	CD-125	400/1200
1	35	G.E.	CD-147	300/1200
1	35	Rel.	35P	250/1000
1	32½	Whse.	SK-150	400/1200
1*	30/75	Whse.	SK-151L	400/1200
1	30	Al.Ch.	E-145	400/1200
1	30	G.E.	CDM-105	875/1750
2	27½	El.Dy.	15S	450/1350
1	25	G.E.	RF-13	600/1600
1	25	Whse.	SK-140	400/1200
1	25	Whse.	SK-111L	250/1000
2	20	Al.Ch.	E-130	400/1200
3	20	G.E.	CD-123	300/1200

All above 230-VDC except where marked ***.

*** Pedestal bearing mill design 525/600-VDC. (Rev.) Designed for mill reversing service.

* T.E.F.C.

T. B. MAC CABE COMPANY

4310 CLARISSA STREET — Phone DAvenport 4-8300 — PHILADELPHIA 40, PENNA.

MARION ELECTRIC SHOVEL

8 cu. yd. Model 5320, caterpillar mounted. Boom Length 93'6". In excellent condition, ready for operation. Complete, including $10,000 worth spare parts.

$55,000 where is, as is—Asbestos, Que.

For further details address

R. P. Shupper, P.A.,
Johns-Manville Corp.
22 East 40th St. New York 16, N.Y.
Phone: LEx. 2-7600

MINE HOISTS

Denver Engrg Wks 2-drums 60" dia. cap. 12000# 600 FPM - 440-v.
Denver Engrg Wks 2-drums 54" dia. cap. 7500# 500 FPM - 440-v.
Wellman-S-M 2-drums 100 hp 440-v
H&B (Vulcan) 1-drum 75 hp 440-v
Denver Engrg Wks 1-drum 50 hp 440-v
Ottumwa 1-drum 30 hp 440 volts

PAUL F. SMITH
39 W. Adams St. — Phoenix, Arizona

FOR SALE

DIESEL ENGINE — ELECTRIC GENERATOR
ATLAS IMPERIAL DIESEL ENGINE — 275 H.P., 8 cylinder, 9" x 10½", 514 RPM, direct connected to ELECTRIC MACHINERY MFG. CO. GENERATOR—175 K.W., 219 K.V.A., 220-440 volts, 60 cycle, 3 phase, 480-514 RPM. With master switch and synchronizing equipment.

FS 2163 Engineering & Mining Journal
330 W. 42 St., New York 18, N.Y.

1 Dorr Super Agitator "Wallace" Type No. 1RK8725 — 5 x 6 — good condition — spare propeller — no motor. F.O.B. Fredericksburg $500.00

1 Dorr Sub A Flotation Machine No. 10085-1 — wood construction with steel countershaft frame — very good condition. F. O. B. Fredericksburg $3,000.00

PANAMINAS INC.
230 Park Avenue New York, N. Y.

DRYER or KILN: Allis Chalmers 10 ft. x 90 ft., heavy duty, plate thickness 22.95 lbs. per sq. ft., complete with or without coal fired Furnace, Western Precipitation Dust Collector, Clarage #41 Exhauster, Motors, Control equipment, etc.

FEEDER: Heavy duty manganese steel Apron Feeder, 60" wide, 15 ft. long. NEW condition.

CRUSHERS: 1—36 x 48 all steel Jaw Crusher, V-belt drive. 1—18x30", all steel, Jaw Crusher, roller bearing equipped, with 60 H.P., 440 volt, V-belt drive, NEW condition. 1—Symons 2 ft. and one 3 ft. Cone Crushers. 1—Telsmith 2 ft. Cone.

COMPRESSORS: 1—Worthington 2 stage, 20/18-½ x21, 600 H.P. synchronous motor, 3 phase, 60 cycle, 440 volt, 180 RPM, cap. 3000 CFM, 100 lbs. pressure, complete with auxiliary equipment. In operation now, available immediately. 1—Chicago Pneumatic portables, 500 ft. capacity with D13000 caterpillar diesel motor.

HOIST—SPECIAL: 1—200 H.P., double drum, 8' dia., 5' face, one clutched, one tight, 16,000 lbs., 750 FPM, with or without head frame, cages, skips, etc.

MINE HOISTS: Single and double drum 150 H.P. to 2500 H.P.

CLASSIFIERS: 2—WEMCO 78". 2—Aikens 54". NEW condition.

MINE LOCOMOTIVE: 1—10 ton, 36" gauge, 250 volt, D.C.

PULVERIZERS: Hardinge 10 ft. x 38", 300 H.P. synchronous motor, with all auxiliary equipment for dry grinding. NEW condition. One Hardinge Mill size 5 ft. x 22", complete with disc feeder and 30 H.P. motor.

PUMPS: 1—950 GPM, 310 ft. head with 100 H.P., 2200 volt motor. 1—10". 3 stage, 2000 GPM, 475 ft. head, without 300 H.P. motor. 1—6", three stage, 1250 GPM, 475 ft. head with 200 H.P., 440 volt motor. 2—NEW portable 4" centrifugal, with 64 H.P. Chrysler INDSA engine.

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300 — 3-8301

CRUSHERS FOR SALE

One Kennedy Van Saun No. 17 Crusher and one No. 37½ without spider casting. These crushers with motors and feeders never used. For particulars write W. H. Loomis Talc. Corp., Gouverneur, N. Y.

SHOVELS

SUBJECT TO PRIOR DISPOSITION

1—Bucyrus-Erie 54B Diesel Standard Shovel completely overhauled, ready to go. Location New Jersey.

Lima Type 2101 Loading Shovel. 2½ c.y. Dipper, 28 ft. stick. New 1946. Located Mountain Area, Minnesota.

Price $37,500

111 M Marion Standard Shovel Attachment, 30 ft. boom, 23'8" Stick, 3½ yd. Manganese Bucket. This item is brand new. Located in Johnstown, Pa. Immediate delivery at considerable less than replacement cost.

Manitowoc model 2000B 1 ¼ c.y. Combination standard shovel and dragline with Caterpillar 13000 diesel. Good condition.

$22,000 FOB Johnstown, Pa.

1—Bucyrus-Erie 54B Hi-Lift Shovel Front with 45' Boom, 32' Tubular Steel Handle and two c.y. Dipper. Location Johnstown, Pa.

Lima Type 1201 Standard Shovel and Dragline. Long Crawlers, Wide Tread, 32' 6" Shovel Boom, 22' Dipper Handle, 3 c.y. Dipper, 80 ft. Dragline Boom complete with fair leads, etc. 1500 KW Light Plant in excellent operating condition. Serial number 5289. Cummins Type L. Diesel, in good operating condition.

$68,000 FOB, Meadsville, Pa.

Four Le Tourneau, model W Scrapers, all in good condition, two rebuilt since last use, 2400x29 tires 75% or better. Location New Jersey.

We also have several Hi-front Shovel attachments for Lima Model 1201 machines.

WILL CONSIDER RENTAL

S.J.GROVES
AND SONS COMPANY

19 Rector Street, New York, N. Y.
WHitehall 3-1055

ALPHABETICAL INDEX TO ADVERTISERS

**Where an asterisk * precedes manufacturer's name, more detailed information may be found in the *1950-51 edition of the Mining Catalogs*
(This index is published as a convenience to the reader. Every care is taken to make it accurate, but E&MJ assumes no responsibility for errors or omissions.)**

*Acker Drill Co., Inc. ... 197
Aero Service Corporation ... 22
*Allen-Sherman-Hoff Pump Co. ... Second Cover
*Allis-Chalmers Co. ... 14, 31, 35, 37, 51, 60
*Allis-Chalmers Co. (Tractor Div.) ... 17
*American Manganese Steel Div. (American Brake Shoe Co.) ... 175
*American Mine Door Co. ... 189
Armstrong, Bray & Co. ... 190
*Atlas Car & Mfg. Co. ... 145
Atlas Powder Co. ... 48
Atlas Steels, Ltd. ... 143
American Wheelabrator & Equipment Corp. ... 179

Baker & Adamson Products, Chemical Div. Allied Chemical & Dye Corp. ... 118
*Baldwin-Lima-Hamilton Corp. ... 178
*Bethlehem Steel Co. ... 61
*Birdsboro Steel Fdry. & Machine Co. ... 187
*Bixby-Zimmer Eng. Co. ... 140
Booth Engineers ... 193
Boston Woven Hose & Rubber Co. ... 156
*Boyles Bros. Drilling Co., Ltd. ... 117
Bucyrus-Erie Co. ... 158
*Buell Engineering Co. ... 184
Bullard Co., E. D. ... 170

*California Wire Cloth Corp. ... 120
*Card Iron Works Co., C. S. ... 147
*Carlon Products Corp. ... 172
Carlyle Rubber Co., Inc. ... 127
Caterpillar Tractor Co. ... 19
*Chicago Pneumatic Tool Co. ... 32
*Christensen Diamond Products Co. ... 148
*Colorado Fuel & Iron Corp. ... 120
Colorado Iron Works Co. ... 183
*Columbia Steel Co. ... 29
*Coppus Engineering Corp. ... 171
*Crane Co. ... 50
Crucible Steel Co. of America ... 122

*Denver Equipment Co. ... 18
Diamond Power Specialty Corp. ... 155
*Dings Magnetic Separator Co. ... 166
Dodge Manufacturing Corp. ... 16
*Dorr Company ... 115
*Dow Chemical Company ... 23
duPont de Nemours & Co., E. I. (Inc.) (Rayon Div.) ... 55

*Edison Storage Bat. Div., Thos. A. Edison, Inc. ... 132
*Eimco Corporation ... 11
*Electric Storage Battery Co. ... 111

Farval Corporation ... 10
Flexible Steel Lacing Co. ... 193
Flexible Tubing Corp. ... 140
Flexible Valve Corp. ... 190

Gallgher Co. ... 129
*Gardner-Denver Co. ... 65
Gates Rubber Co. ... 54
General Refractories Co. ... 42, 43
Georgia Iron Works ... 144
General Tire & Rubber Co. ... 173
Gould-National Batteries, Inc. ... 176
*Goodman Manufacturing Co. ... 53
Goodrich Company, B. F. ... 4
Goodyear Tire & Rubber Co. ... 21
Greensburg Machine Co. ... 152
Grinnell Co., Inc. ... 163

Hammond Co., J. V. ... 193
*Hardinge Co., Inc. ... 134
Hawthorne, Inc., Herb. J. ... 141
Harnischfeger Corp. ... 39
Hayes Steel Products, Ltd. ... 159
*Hendrick Mfg. Co. ... 189
*Holman Bros., Ltd. ... 59
Hercules Powder Co. ... 176
Hyster Company ... 62

Industrial Brownhoist Corp. ... 169
*Ingersoll-Rand Co. ... 3
International Harvester Co. ... 168
International Nickel Co. ... 177

*Jeffrey Manufacturing Co. ... 161
Johnson, C. S. ... 8, 9
*Jones & Laughlin Steel Corp. ... 38
*Joy Manufacturing Co. ... 12, 13, 33

*Kennametal, Inc. ... 147
*Kennedy-Van Saun Mfg. & Engr. Corp. ... 40, 41
Knox Manufacturing Co. ... 148
Koehring Co. ... 8, 9
Kwik-Mix ... 8, 9

*Laughlin Co., Thomas ... 133
LeRoi Company (Cleveland Div.) ... 57
*Leschen & Sons Rope Co., A. ... 181
LeTourneau, Inc., R. G. ... 26, 27, 154
*Lippmann Eng. Works ... 197
Lubriplate Div., Fiske Bros. Refining Co. ... 195
Lufkin Rule Co. ... 170

Mare Company ... 150
*Mancha Storage Battery Locomotive Div. Goodman Mfg. Co. ... 53
Manhattan Rubber Div. ... 45
Merck & Co., Inc. ... 145
McGraw-Hill Book Co. ... 197
Miller Electric Mfg. Co. ... 192
*Merrick Scale Mfg. Co. ... 148
Mine & Smelter Supply Co. ... 56, 191
*Morris Machine Works ... 136
*Mosebach Electric & Supply Co. ... 149
Mt. Vernon-Woodbury Mills ... 185

*National Malleable & Steel Castings Co. ... 167
*Naylor Pipe Co. ... 130
New York Engineering Co. ... 192
Nicholson & Co. ... 154
*Nordberg Manufacturing Co. ... 34
Northwest Engineering Co. ... 15

Ohio Brass Co. ... 20
*Osmose Wood Preserving Co. of America ... 142

Parsons Co. ... 8, 9
Pennsylvania Drilling Co. ... 192
Pittsburgh Lectromelt Corp. ... 165

*Quaker Rubber Corp. ... 124

Radio Corporation of America ... 139
Raybestos-Manhattan, Inc. ... 45
Republic Rubber Div. of Lee Rubber & Tire Corp. ... 164
Rollway Bearing Co. ... 52
Rogers Iron Works Co. ... 157
Ryerson & Son, Inc., J. T. ... 113

*Sauerman Bros. ... 135
Searchlight Section ... 198, 201
*Simplex Wire & Cable Corp. ... 49
Sink & Float Corp. ... 186
Shafer Bearing Corp. ... 195
*Skookum Co., Inc. ... 146
Smidth & Co., F. L. ... 182
Smit & Co., Anton ... 191
*Smit & Sons, Inc., J. K. ... 190
Spang & Company ... 153
*Sprague & Henwood, Inc. ... 150
Standard Oil Co. of Cal. ... 119
*Stearns-Roger Mfg. Co. ... 137
*Stephens-Adamson Mfg. Co. ... 36
Straub Manufacturing Co. ... 152
*Sturtevant Mill Co. ... 58
Syntron Company ... 149

Taylor-Wharton Iron & Steel Co. ... 146
Telluride Iron Works Co. ... 191
Tennessee Coal, Iron & R. R. Co. ... 29, 131
Texas Company ... 6, 7
*Thermoid Company ... 126
*Thomas Flexible Coupling Co. ... 128
Thew Shovel Co. ... 160
Throwaway Bit Corporation ... 30
*Timken Roller Bearing Co. ... Fourth Cover
*Traylor Engineering & Mfg. Co. ... 25, 63

United States Rubber Co. ... 24, 151
*United States Steel Co. ... 29, 131
*U. S. Steel Subsidiaries ... 29, 131
*United States Steel Export Co. ... 29, 131

Victaulic Co. of America ... 121

Walworth Company ... 44
*Wedge Wire Corporation ... 154
Western Machinery Co. ... 28
Western Precipitation Corp. ... 180
Western Rock Bit Mfg. Co. ... 162
Westinghouse Electric Corp. ... 46, 47
Whitcomb Locomotive Co. ... 195
*Wickwire Spencer Steel Corp. ... 120
*Wilfley & Sons Co., Inc., A. R. ... 66
Windsor & Co., Ltd., H. ... 153

Yardley Plastics Co. ... 64
Yuba Manufacturing Co. ... 138

PROFESSIONAL SERVICES ... 196

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant ... 198
Selling Opportunities Offered ... 198
Positions Wanted ... 198

SPECIAL SERVICES
Contract Work ... 198

BUSINESS OPPORTUNITIES
Offered ... 198
Wanted ... 198

NOTICES
Legal ... 200

PROPERTY
For Sale ... 198
Wanted ... 198

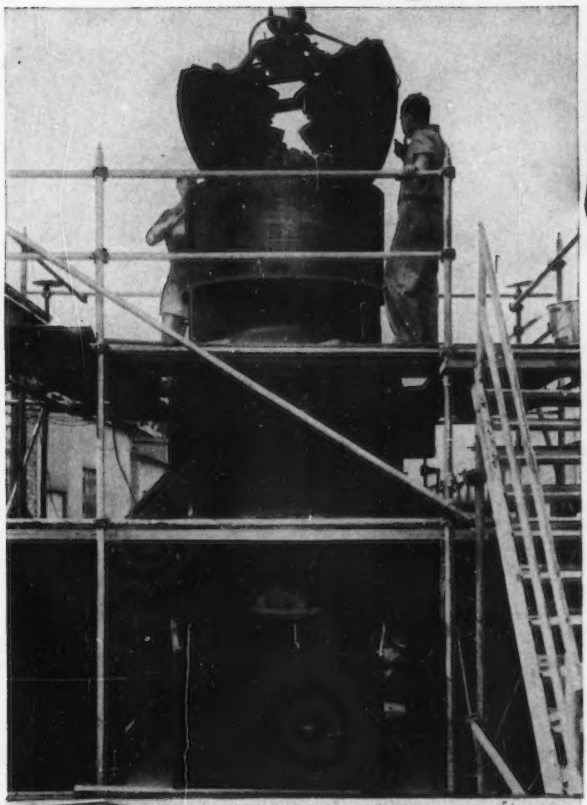
EQUIPMENT
(Used or Surplus New)
For Sale ... 198-201

WANTED
Equipment ... 200
Miscellaneous ... 198

ADVERTISERS INDEX

Atkinson Company, Guy F. ... 199
Central Contractors Service, Inc. ... 199
Electric Equipment Co. ... 200
Evans, J. Buren ... 198
Florence Machinery & Supply Co. ... 200
Groves & Sons Co., S. J. ... 201
Harris, J. Henry ... 198
Heineken, W. P. ... 199
Johns-Manville ... 201
Joplin Machinery & Electric Co. ... 200
Lefton Industrial Corp. ... 200
Loomis Talc Corp., W. H. ... 201
MacCabe Co., T. B. ... 201
Miller Machinery Co., Inc. ... 200
Morse Brothers Machinery Co. ... 199
O'Neill, A. J. ... 201
Panaminas, Inc. ... 201
Pierce Cable Co. ... 200
Richardson, Weston H. ... 198
Rocks & Minerals ... 198
Skinner, Ltd., Walter ... 198
Smith Company, H. Y. ... 200
Smith, Paul F. ... 201
Spring Hill Corp. ... 199
Stanhope, Inc., R. C. ... 199
Universal Wire & Cable Co. ... 199

WILL YOUR CRUSHER MEET THIS Strength Test?



Oscillograph readings of strain on *Hydrocone* crusher were made at various points on the topshell spider, topshell, bottomshell and bottom plate. Test was made in A-C Processing Machinery laboratory by Allis-Chalmers engineers.

IN A SPECIAL TEST, the actual stress on various parts of a *Hydrocone* crusher was measured with an oscillograph. This stress analysis showed that strain on the crusher did not exceed 4000 psi at any point — even though hard taconite ore was being crushed.

The test indicated, too, how well various elements of the *Hydrocone* crusher are proportioned for high strength — vital to long life and low maintenance!

NO DEAD WEIGHT

All weight in the *Hydrocone* crusher is concentrated into resisting the crushing force. Top and bottom shell, eccentric and spider cap are of cast steel construction. The short, heavy mainshaft is annealed forged steel. Mantle and concaves are of a special steel.

Hydraulic *Speed-Set* control enables the operator to change product size quickly and easily. Automatic Reset provides hydraulic protection from tramp iron.

More facts about the *Hydrocone* crusher can be obtained from the A-C representative in your area, or by writing for *Hydrocone* crusher Bulletin 07B7145B. Allis-Chalmers, Milwaukee 1, Wis.

A-3487

Hydrocone and *Speed-Set* are Allis-Chalmers trademarks.

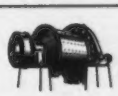
ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators

Vibrating Screens

Jaw Crushers



Grinding Mills

Gyratory Crushers

Kilns, Coolers, Dryers

Only the Timken Company offers all 3 rock bit types and a complete rock bit engineering service!

WHATEVER your drilling conditions, there's a Timken® rock bit to meet them. And the Timken Rock Bit Engineering Service will help you pick it out! This service is the only *complete* rock bit engineering service offered by any rock bit manufacturer, because only the Timken Company makes *all 3* rock bit types:

1 MULTI-USE. Gives lowest cost per foot of hole when full increments of drill steel can be drilled and when control and reconditioning of bits are correct.

2 CARBIDE INSERT. For drilling extremely hard and abrasive ground, small holes, extra deep holes. Holes go down faster, bit reconditioning is simplified.

3 ONE-USE "SPIRALOCK". To use where reconditioning is not feasible. Gives lowest unit cost of the three. "Spiralock" union holds bit on dependably, permits easy removal.

Our rock bit engineers have been solving rock bit problems for the past 18 years. So whether you're looking for lower bit cost, lowest cost per foot of hole drilled, greatest possible drilling speed, or any other advantage, let us help you get it. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

FREE BOOKLET! *Shows full line of bits with detailed descriptions, plus other useful rock bit data. Write for your copy.*

TIMKEN ... *your best bet for the best bit ... for every job*

TRADE-MARK REG. U. S. PAT. OFF.